RP-5 Renewable Energy Efficiency Project

Quarterly Technical Report

October 1, 2003 – December 31, 2003

Submitted By:

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DOE Award No. DE-FC26-02NT41475

Inland Empire Utilities Agency
6075 Kimball Ave
Chino, CA 91710

DISCLAIMER

ABSTRACT

This is the sixth quarterly technical report for the RP-5 Renewable Energy Efficiency Project. The report summarizes the work progress, effort and activities that took place during the period from October 1, 2003 through December 31, 2003. The report has been prepared in accordance with the Department of Energy (DOE) Guidelines.

In coordination with the DOE, IEUA has revised the original Cooperative Agreement to reflect the actual and current project scope of work. The original Agreement statement of work (SOW) included conceptual and preliminary equipment and systems, which were further evaluated for feasibility and suitability for the project. As a result, some of the equipment was taken out of the project scope.

In response to questions from the DOE, IEUA has submitted a summary report on the Organic Rankine Cycle (ORC) secondary power generation units for availability and suitability for this project and associated safety concerns pointed out by the DOE.

IEUA has awarded the consulting engineering contract to Parsons Water and Infrastructure, Inc. to provide the project's design and construction services. The project's pre-design kickoff meeting was held at IEUA's headquarters on December 11, 2003.

IEUA has submitted a proposal for a grant offered by California Energy Commission (CEC) which if awarded to IEUA, will add value to this project.

IEUA has finalized and signed the agreement with Stirling Energy Systems (SES) to host a 25 kW Stirling Engine at the RP-5 plant site for reliability and performance testing using digester and natural gas.

As a result of further evaluation of the flexible microturbine system, IEUA has decided to take it out of the project's scope of work; however, it may be considered in future projects at other locations.

IEUA has installed a 60 kW Photovoltaic (PV) power generation system on the roof of the new headquarters building.

A matching funds update is also included in the Results and Discussion section. The update presents the work effort performed by CH2M Hill, the PIER Consultant, and the associated costs that serve as matching funds for the RP-5 Renewable Energy Efficiency Project during this report period.

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INTRODUCTION

There are six major tasks that are addressed during this report period. These tasks are listed below:

- Revision of the Original Cooperative Agreement
- Organic Rankine Cycle (ORC) Systems Survey
- Award of Consulting Engineering Contract to Parsons
- Finalizing Stirling Engine Agreement
- Submitting a Proposal for the CEC Grant
- Removal of the Flexible Microturbine from the Project's Scope of Work
- 60 kW Photovoltaic power generation system

Revision of the Original Cooperative Agreement

Upon review of the detailed special report that IEUA submitted to the DOE on August 25, 2003, the DOE raised several issues concerning the fuel cell incorporation in the project and the associated gas cleaning and treatment system as indicated in the DOE e-mail dated September 9, 2003. IEUA and DOE held a conference call on September 23, 2003 to discuss and address the DOE's concerns. As a result, IEUA and DOE agreed that IEUA needed to revise the Agreement scope of work and other associated documents and submit them to the DOE for approval.

On October 17, 2003, IEUA submitted the modified agreement package, which included the following:

- Revised Statement of Work;
- Revised Equipment List;
- Revised Project Schedule;
- Digester Gas Analysis; and,
- Summary Report on Gas Cleanup Systems and Design

The purpose of this modification package was to update the project's status including description, approach, criteria, equipment, schedule and budget to reflect the actual work that has been done since the execution of the Agreement in July 2002, and to outline in detail the current project's scope of work. The project has gone through planning and conceptual design phases, where several pieces of equipment and systems have been evaluated for consideration or removal from the project scope based on feasibility and suitability; there was a strong need to revise the scope of work to bring it up to date. IEUA has indicated that the nature of this project dictates that some major and vital equipment with long lead time needs to be pre-purchased in order to meet the revised project schedule. We can not quantify the dollar amount at this time, but upon completion of the pre-design phase, additional money will need to be transferred from Budget Period 2 to Budget Period 1 in order to pre-purchase this equipment. IEUA will submit a request

to modify the contract for the pre-purchase of the equipment when the dollar amount that is needed is known.

The revised Statement of Work included a separate task that addressed the future incorporation of the fuel cell in the project, subject to the availability of additional funding from the DOE and other sources. The said task will be included in the project's predesign report, and will have the following activities:

- Technical evaluation of a fuel cell;
- Evaluation of a potential fuel cell operation and maintenance;
- Economical and financial analysis including assessment of capital costs, life cycle costs, payback, additional funding, etc.;
- Reserving a space for a future fuel cell;
- Providing design flexibility and interconnections to accommodate a fuel cell;
- Gas analysis and evaluation of digester gas derived from animal manure and biosolids to verify suitability for use in fuel cells; and,
- Design and layout of a fuel cell gas cleaning system

To enhance the communication process between IEUA and the DOE, IEUA will be setting up a quarterly conference call with the DOE's respective personnel to further discuss the quarterly technical report and other issues of concern to either party.

Organic Rankine Cycle (ORC) Systems Survey

IEUA conducted a survey to investigate the available types of Organic Rankine Cycle (ORC) systems that may be used for this project. The survey was a result of the DOE's safety concern associated with using flammable iso-pentane as the working fluid with certain types of ORC systems. The summary of the survey was sent via e-mail to the DOE on November 4, 2003. IEUA has contacted three ORC system manufacturers and the result of the survey was as follows:

- Ormat: Manufacturing facility is based in Israel. Ormat's ORC uses flammable iso-pentane as the working fluid; however, Ormat advised that the pentane is well sealed, and their ORC system is safe as they have installed many units that are operating satisfactorily. A copy of Ormat's frequently asked questions (FAQ's) addressing pentane leakage was also sent to the DOE.

- Turboden: Manufacturer is based in Italy. Turboden's ORC uses non-flammable thermal silicon; however, Turboden does not have an ORC unit size which suits this project. In addition, they do not have a representative in the Untied States nor do they have any installations in the U.S.

- UTC Power: Manufacturer is based in the United States. UTC Power uses non-flammable refrigerant R-245 as the working fluid. They have a 200 kW demonstration unit in Connecticut.

The selection of the most suitable ORC unit will be part of the predesign activities which commenced on December 11, 2003.

Award of Consulting Engineering Contract to Parsons

On November 19, 2003, IEUA awarded the RP-5 Renewable Energy Efficiency Project consulting engineering contract to Parsons Water and Infrastructure, Inc. Parsons will provide design and engineering services for the project through the construction phase. A copy of the fully executed engineering contract with Parsons is attached in Appendix A. The total cost for this contract including design, services during construction and optional environmental services is $1,506,810.

On December 11, 2003, IEUA held the kickoff meeting to commence the predesign phase. Parsons presented the Project Management Plan (PMP), which is a template as to how they will manage the project. A copy of the kickoff meeting minutes is attached in Appendix B.

Finalizing Stirling Engine Agreement

On October 27, 2003, IEUA and Stirling Energy Systems (SES) finalized and signed an agreement under which IEUA will host a 25 kW Stirling engine for testing on natural and digester gas at the Regional Plant No. 5 (RP-5). Currently, SES is preparing for testing the Stirling engine's burner at Arizona State University (ASU).

The Stirling engine will be installed near the new headquarters building absorption chillers system pad. Phase I of this demonstration project will only involve running the engine on both fuels one at a time starting with natural gas. The engine's combustion stability, reliability and performance will be evaluated by SES. IEUA will provide a concrete pad, enclosure, cooling water and gas piping, and electrical connections.

Submitting a Proposal for the CEC Grant

IEUA has submitted a proposal for a grant offered by the CEC. The grant is associated with Combined Heat and Power Research, Development, and Demonstration Projects. The grant, if awarded to IEUA, will add a tremendous value to this project and help expand the project to include a manure sludge drying system.

Removal of the Flexible Microturbine from the Project's Scope of Work

IEUA would like to remove the flexible microturbine from the project's scope of work. (A request for amendment of the contract will be submitted with the request for transferring the budget for the pre-purchase of equipment when the pre-design is complete.) Since the flexible microturbine uses a low Btu gas (as low as 15 Btu/scf fuel or 2 percent methane), it is best when used in an odorous environment such as a composting facility where methane tracing may be present in the foul air stream. Gas samples and foul air analysis performed by IEUA revealed that there is not a suitable

application/location for the flexible microturbine at IEUA's facilities. The low Btu gas from the acid digester at RP-1 has a heating value of 280-350 Btu/scf which can be used with the internal combustion engines when treated and mixed with the cleaner and higher Btu digester gas. Possible implementation of the flexible microturbine at the co-composting facility, which is currently in the final design phase, may be evaluated in the future.

PV System for Agency's Headquarters

Although this is not part of the DOE grant, IEUA would like to advise DOE regarding another innovative renewable energy project that IEUA is pursuing at its new headquarters buildings. IEUA has installed a 60 kW photovoltaic (PV) power generation system on the roof of the new headquarters building. The PV system will produce power once Southern California Edison (SCE) gives IEUA an interconnection agreement. IEUA has applied for this agreement and is awaiting approval. The PV system includes 2-20 kW PV panels and 10-2 kW panels. This project is one of the activities of the California Energy Commission (CEC) PIER Program.

EXECUTIVE SUMMARY

The RP-5 Renewable Energy Efficiency Project continued its progress and has achieved a significant milestone by awarding the consulting engineering contract to Parsons Water and Infrastructure, Inc. and commencing the pre-design phase. Activities that took place during this report period are summarized as follows:

- Revising Original Cooperative Agreement (Amendment No. M-004)

    - The DOE Agreement Statement of Work was revised to reflect the current project's scope of work;
    - The original equipment list and associated costs were updated to show the equipment which will be used for the project. The original equipment list was conceptual and preliminary in nature;
    - Agreement budget periods 1 and 2 were revised to reflect the cost of equipment pre-purchased and to show the project's anticipated design and construction costs. The project's total cost remains unchanged;
    - The project's schedule was revised to reflect the actual status of the project after completion of several phases: conceptual design, in-house preliminary design, Request for Proposal process for the consultant, and, consultant proposal evaluation. The original schedule was prepared during the planning stage and was preliminary in nature;
    - After removing the fuel cell from the equipment list, and pursuant to discussions with the DOE, a new task was added to the Statement of Work to address the future incorporation of a fuel cell in the project subject to additional funding;
    - Pre-design activities will include space allocation, interconnections, gas cleanup system design and the layout for incorporating a future fuel cell into the project; and,
    - The first "Budget Period" was revised to 7/12/02 through 10/26/04; the overall "Project Period" was revised to 7/12/02 thru: 1/08/06.

- Consulting Engineering Contract Award

    - The consulting engineering contract was awarded on November 19, 2003 to Parsons Water and Infrastructure, Inc.;
    - Parsons will be providing the project's design and construction services as detailed in the attached Contract No. CKB03076 (Appendix A);
    - The consulting engineering contract amount is $1,506,810 including all optional environmental service which may be required for the project to comply with local and State regulatory agencies;
    - The project's kickoff meeting was held on December 11, 2003 to officially commence the pre-design phase; and,
    - Topics discussed in the kickoff meeting included quality assurance, decision log and tracking, filing system, schedule, and other important

issues with the objective of delivering a quality project design on schedule and within budget.

- Organic Rankine Cycle (ORC) Systems Survey

  - The intention of the survey was to address a safety concern associated with potential leakage of the flammable iso-pentane used with Ormat ORC system;
  - Ormat advised IEUA that their system does not pose any safety threat; the pentane system is a closed/sealed system; and pentane emissions are fugitive and adequately permitted;
  - Turboden, an ORC system manufacturer, uses non-flammable thermal silicon but does not have a suitable size unit to offer for this project;
  - The UTC Power ORC unit uses non-flammable Refrigerant-245 for their 200 kW demonstration unit; and,
  - Details of the ORC systems survey were included in IEUA's e-mail to DOE dated November 26, 2003.

- CEC Grant

  - IEUA submitted a proposal for a California Energy Commission (CEC) grant for the Combined Heat and Power Research, Development, and Demonstration Projects;
  - Uniqueness, innovative approach and energy efficiency are believed to be major points that will qualify the project for the CEC grant; and,
  - The CEC grant will add tremendous value and tangible benefits to the DOE project.

- Stirling Engines

  - IEUA and SES signed an agreement on October 27, 2003 for IEUA to host a 25 kW engine at the RP-5 Plant site;
  - IEUA and SES have exchanged design requirements and other information in preparation for the installation of the Stirling engine and auxiliary systems.
  - The Stirling engine's burner is being tested at ASU prior to setup at IEUA.

- Flexible Microturbine

  - The flexible microturbine was taken out of the project's scope as IEUA could not find a suitable location and/or application where this unit could be used efficiently; and,
  - IEUA will investigate whether the microturbine can be used at its new co-composting facility, which is in the final design stage at this time;

EXPERIMENTAL

The RP-5 Renewable Energy Efficiency Project throughout the conceptual design and research phase, and through the preliminary design phase, will continue to use standard research methods and equipment such as computers, phones, internet, etc. The methods and steps that have been utilized in this project include, but are not limited to the following:

- Manufacturers' survey, communications, literatures, catalogues, etc.;
- Technical workshops;
- Communications with leading experts;
- Communications with environmental control agencies;
- Manufacturers' plant visits;
- Evaluation of specific factory test results for selected equipment;
- Feed back from owners of existing installations;
- Economic evaluation;
- Life Cycle analysis; and,
- Payback calculations.

RESULTS AND DISCUSSION

The RP-5 Renewable Energy Efficiency Project Cooperative Agreement was revised and updated following the detailed project status report that IEUA submitted to the DOE on August 25, 2003 and the subsequent correspondence and phone conversation that took place thereafter. Revision of the Agreement was essential to bring the project up to date in terms of the scope of work, budget and schedule. The original scope of work, equipment list and schedule were developed during the project's planning stage in July 2002. Agreement Modification M004, which reflects an updated scope of work, was executed by DOE on November 6, 2003 and by IEUA on November 20, 2003.

The addition of a separate task to address the future incorporation of a fuel cell into the project's scope came as a result of several constructive discussions between IEUA and DOE. This illustrates the mutual interest of both parties in making this a successful and cost effective project. The task of the fuel cell includes activities such as technical evaluation and financial analysis, gas treatment system design, and providing design flexibility to accommodate a fuel cell, will all be taking place during the pre-design stage, which is currently ongoing. However, actual implementation (procurement and installation) of a fuel cell is a future task subject to availability of additional funding.

The award of the project's consulting engineering contract to Parsons Water and Infrastructure, Inc. marks an important milestone to start the pre-design phase. The kickoff meeting discussed the project in general, and the consultant's plan and approach, in particular, to bring this unique project to completion on time and within budget. The project includes an innovative and sophisticated control system to go in line with the innovative equipment and systems design; therefore, emphasis was made during the

meeting to have a reliable system to control information flow, decision logging and tracking, and records keeping.

IEUA has widened the survey circle for the Organic Rankine Cycle (ORC) system manufacturers and contacted new manufacturers besides Ormat. IEUA contacted UTC Power who has designed and built a 200 kW ORC demonstration unit in Connecticut. Later on, UTC verbally advised that they have two more units being installed in Texas. IEUA will be investigating those installations more closely to assure that the best and most reliable and efficient ORC technology is used for this project.

The proposal that IEUA submitted for the CEC grant is basically driven by the value and benefits that will be added to this innovative project. If awarded, the project will shift a portion of the money toward the intended sludge drying system at the RP-5 dairy manure facility. The sludge drying system will primarily use the heat recovered from the internal combustion engine at the Desalter Plant adjacent to RP-5 Plant, and whenever possible, from the RP-5 Renewable Energy Efficiency Project to further dry the manure sludge to about 65% solids content. This will allow IEUA to dispose or sell the dried sludge directly to fertilizer packaging facilities.

The implementation of the Stirling engine demonstration project is slightly behind schedule; however, IEUA's responsibility is limited to hosting the system and providing gas, water and power. The majority of the project is mainly coordinated between Stirling Energy Systems (SES), the engine supplier, and California Energy Commission (CEC), the funding party.

The decision to remove the flexible microturbine from the project's scope of work falls in line with the project's goal of achieving higher energy efficiencies. Implementation of the flexible microturbine system will be evaluated at other locations in the future.

PIER Matching Funds

The DOE funded Renewable Energy Efficiency Project and the California Energy Commission funded Commonwealth Public Interest Energy Research (PIER) program to make renewable energy more affordable are closely linked and mutually beneficial. The PIER program is intended to foster the development of renewable energy demonstration projects in the Chino Basin. This program includes projects involving biogas from dairy waste and wastewater treatment plants as well as general planning and analysis activities. Relevant PIER Program activities include the Planning and Analysis Project (Project 1.1), the Enhanced Energy Recovery at Waste Water Treatment Plants Project (Project 2.2) and the Dairy Waste to Energy Project (Project 3.1). In the current reporting period, work was undertaken on several tasks in Project 1.1 and Project 2.2 linked to the DOE's RP-5 Renewable Energy Efficiency Project. This work included tasks totaling approximately $54,000, which serve as matching funds for the RP-5 Renewable Energy Efficiency Project. Therefore, overall PIER matching fund expenditure for this period total $54,000. These costs are not included in the current quarter's Financial Status

Report; when IEUA receives proper back-up documentation from Commonwealth, these costs will be included in the report. Additional expenditures on Project 1.1, 2.2 and 3.1 will be presented in future quarterly reports.

CONCLUSION

The RP-5 Renewable Energy Efficiency Project is moving ahead as planned and anticipated. The project's main highlights are summarized below:

- Original grant Agreement scope of work has been revised;
- Original Agreement equipment list and budget have been updated;
- Project's schedule has been revised;
- Project is on schedule (as revised);
- Project is on budget;
- Project's consulting engineering contract has been awarded to Parsons;
- Project's pre-design phase was commenced with the kickoff meeting in December 2003;
- IEUA has applied for a grant from CEC for an added value to this project; no word yet from the CEC;
- UTC Power has been preliminary investigated as a potential supplier for the ORC system;
- Stirling engine demonstration project is slightly behind schedule; and,
- Flexible microturbine was removed from the project's scope.

Inland Empire
UTILITIES AGENCY

CONTRACT NUMBER: CKB03076

**RP-5 RENEWABLE ENERGY EFFICIENCY PROJECT
FEATURING INTERNAL COMBUSTION ENGINES,
HEATING AND COOLING SYSTEMS, THERMAL ICE STORAGE,
ORGANIC RANKINE CYCLES (ORC), HEAT RECOVERY SYSTEMS, AND OTHER
STATE-OF-THE-ART DESIGN COMBINATIONS**

THIS CONTRACT (the "Contract"), is made and entered into this 19 day of Nov 2003, by and between the Inland Empire Utilities Agency, a Municipal Water District, organized and existing in the County of San Bernardino under and by virtue of the laws of the State of California (hereinafter referred to as "Agency"), and Parsons Water and Infrastructure Inc. of Pasadena, California (hereinafter referred to as "Consultant"), for engineering services for the evaluation and design of the following: Organic Rankine Cycle (ORC) System; Thermal Ice Storage; and, Natural Gas Compression and Air Blending System, ("the Project") at the Agency's Recycling Plant No. 5 (RP-5) Facility.

NOW, THEREFORE, in consideration of the mutual promises and obligations set forth herein, the parties agree as follows:

1. PROJECT MANAGER ASSIGNMENT: All technical direction related to this Contract shall come from the designated Project Manager. Details of the Agency's assignment are listed below.

Project Manager: Jamal Zughbi, P.E.
Address: 6075 Kimball Avenue, Bldg. B
Chino, California 91710
Telephone: (909) 993-1698
Facsimile: (909) 597-8702
Email: jzughbi@ieua.org
Under the supervision of Eliza Jane Whitman (909) 993-1685

2. CONSULTANT ASSIGNMENT: Special inquiries related to this Contract and the effects of this Contract shall be referred to the following:

Consultant: Surendra Thakral, P.E., DEE
Parsons Water and Infrastructure Inc.
Address: 100 West Walnut Street
Pasadena, California 91124
Telephone: (626) 440-6263
Facsimile: (626) 440-2630
Email: surendra.thakral@parsons.com

3. ORDER OF PRECEDENCE: The documents referenced below represent the Contract Documents. Where any conflicts exist between the General Terms and Conditions, or addenda attached, then the governing order of precedence shall be as follows:

    1. Amendments to Contract Number CKB03076.
    2. Contract Number CKB03076 General Terms and Conditions.
    3. Consultant's Revised Fee Proposal dated October 24, 2003.
    4. Consultant's Revised Scope of Work dated November 18, 2003.
    5. Agency Request for Proposal (RFP) dated June 14, 2003.

4. SCOPE OF WORK AND SERVICES: Consultant services and responsibilities shall include, and be in accordance with tasks identified in Consultant's Revised Scope of Work dated November 18, 2003 (attached as **Exhibit A**); and Agency's Request for Proposal dated June 14, 2003; which are both incorporated herein by this reference.

    NOTE: Consultant shall advise Agency within two (2) weeks of any changes to the written Scope of Work based upon discussions from the Design Review Meetings. Any changes must be made via an Amendment to this Contract. Work initiated without the formal approval, shall be at Consultant's own risk, and may not be reimbursed by the Agency.

5. TERM: The term of this Contract shall extend from the date of the Notice to Proceed, and terminate on December 31, 2006, unless agreed to by both parties, reduced to writing, and amended to this Contract.

6. COMPENSATION: Agency shall pay Consultant's properly executed invoice in accordance with the Agency's invoice format (attached as **Exhibit B**), approved by the Project Manager within thirty (30) days following receipt of the invoice. Payment will be withheld for any service which does not meet or exceed Agency requirements or have proven unacceptable until such service is revised, the invoice resubmitted, and accepted by the Project Manager.

    Agency may at any time make changes to the Work including additions, reductions, and changes to any or all of the Work, as directed in writing by the Agency. Such changes shall be made by an Amendment to the Contract. The NOT-TO-EXCEED Amount and Work Schedule shall be equitably adjusted, if required, to account for such changes and shall be set forth in the Amendment.

    In compensation for the work represented by this Contract, Agency shall pay Consultant a NOT-TO-EXCEED maximum total of **$1,506,810.00 (Fee Schedule-Exhibit C)** for all services provided. Payment shall be made according to milestones achieved and accepted by the Agency's Project Manager in accordance with the following payment schedule:

7. CONTROL OF THE WORK: Consultant shall perform the Work in compliance with the Work Schedule. If performance of the Work falls behind schedule, the Consultant shall accelerate the performance of the Work to comply with the Work Schedule as directed by the Project Manager. If the nature of the Work is such that Consultant is unable to

accelerate the Work, Consultant shall promptly notify the Project Manager of the delay, the causes of the delay, and submit a proposed revised Work Schedule.

8. FITNESS FOR DUTY:

A. Fitness: Consultant and its Subcontractor personnel on the Jobsite:

1. shall report for work in a manner fit to do their job;

2. shall not be under the influence of or in possession of any alcoholic beverages or of any controlled substance (except a controlled substance as prescribed by a physician so long as the performance or safety of the Work is not affected thereby); and

3. shall not have been convicted of any serious criminal offense which, by its nature, may have a discernible adverse impact on the business or reputation of Agency.

B. Inspection: Searches by Agency authorized personnel may be made of lockers, storage areas, vehicles, persons or personal effects on Agency-owned, or leased property at various times without prior announcement. Such facility inspections may be conducted using detection dog teams to search work areas and other common areas in order to detect evidence of unlawful drug use or the presence of pyrotechnics, explosives, firearms, weapons, or facsimiles thereof, alcoholic beverages and illegal drugs ("Prohibited Items"). Prohibited Items must not be brought onto, or kept on, Agency property.

C. Compliance: Consultant shall advise all contractor and subcontractor personnel and associated third parties of the requirements of this Contract ("Fitness for Duty Requirements") before they enter on the Jobsite and shall immediately remove from the Jobsite any employee determined to be in violation of these requirements. Consultant shall impose these requirements on its Subcontractors. Agency may cancel the Contract if Consultant violates these Fitness for Duty Requirements.

9. INSURANCE: During the term of this Contract, the Consultant shall maintain at Consultant's sole expense, the following insurance.

A. Minimum Scope of Insurance:

1. General Liability: $1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage. Coverage shall be at least as broad as Insurance Services Office form number GL 0001-87 covering Comprehensive General Liability. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this Project/location, or the general aggregate limit shall be twice the required occurrence limit.

2. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage. Coverage shall be at least as broad as Insurance Services Office form number CA 00 01 87, covering Automobile Liability, including "any auto."

3. Workers' Compensation and Employers Liability: Workers' compensation limits as required by the Labor Code of the State of California and employers Liability limits of $1,000,000 per accident.

4. Professional Liability insurance in the amount of $1,000,000 per claim.

B. Deductibles and Self-Insured Retention: Any deductibles or self-insured retention must be declared to and approved by the Agency. At the option of the Agency, either: the insurer shall reduce or eliminate such deductibles or self-insured retention as respects the Agency, its officers, officials, employees and volunteers; or the Consultant shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

C. Other Insurance Provisions: The policies are to contain, or be endorsed to contain, the following provisions:

1. General Liability and Automobile Liability Coverage

a. The Agency, its officers, officials, employees, volunteers, property owners and any engineers under contract to the Agency are to be covered as additional insureds, endorsements GL 20 11 07 66, CG2010 1185 and/or CA 20 01 (Ed. 0178), as respects: liability arising out of negligent activities performed by or on behalf of the Consultant, products and completed operations of the Consultant, premises owned, occupied or used by the Consultant, or automobiles owned, leased, hired or borrowed by the Consultant. The coverage shall contain no special limitations on the scope of protection afforded to the Agency, its officers, officials, employees or volunteers.

b. The Consultant's insurance coverage shall be primary insurance as respects the Agency, its officer, officials, employees and volunteers. Any insurance or self-insurance maintained by the Agency, its officers, officials, employees, or volunteers shall be excess of the Consultant's insurance and shall not contribute with it.

c. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the Agency, its officers, officials, employees or volunteers.

d. The Consultant's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

e. The Consultant may satisfy the limit requirements in a single policy or multiple policies. Any Such additional policies written as excess insurance shall not provide any less coverage than that provided by the first or primary policy.

2. Workers' Compensation and Employers Liability Coverage

The insurer shall agree to waive all rights of subrogation against the Agency, its officers, officials, employees and volunteers for losses arising from work performed by the Consultant for the Agency.

3. All Coverages

Each insurance policy required by this contract shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the Agency.

D. Acceptability of Insurers: With the exception of Professional Liability Insurance, all insurance is to be placed with insurers with a Best's rating of no less than A:VII, and who are admitted insurers in the State of California. Professional Liability Insurance is to be placed with insurers with a Best's rating of no less than B:VII, and who are admitted insurers in the State of California.

E. Verification of Coverage: Consultant shall furnish the Agency with certificates of insurance and with original endorsements effecting coverage required by the Agency for themselves and all subcontractors prior to commencing work or allowing any subcontractor to commence work under any subcontract. The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. All certificates and endorsements are to be approved by the Agency before work commences. The Agency reserves the right to require complete, certified copies of all required insurance policies, at any time.

F. Submittal of Certificates: Consultant shall submit all required certificates and endorsements to the following:

Human Resources Department
Inland Empire Utilities Agency
P.O. Box 697
Rancho Cucamonga, California 91729

10. LEGAL RELATIONS AND RESPONSIBILITIES

A. Professional Responsibility: The Consultant shall be responsible, to the level of competency presently maintained by other practicing professionals performing the same or similar type of work.

B. Status of Consultant: The Consultant is retained as an independent Consultant only, for the sole purpose of rendering the services described herein, and is not an employee of the Agency.

C. Observing Laws and Ordinances: The Consultant shall keep itself fully informed of all existing and future state and federal laws and all county and city ordinances and regulations which in any manner affect the conduct of any services or tasks performed under this Contract, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. The Consultant shall at all times observe and comply with all such existing and future laws, ordinances, regulations, orders and decrees, and shall protect and indemnify, as required herein, the Agency, its officers, employees and agents against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by the Consultant or its employees.

D. Subcontract Services: Any subcontracts for the performance of any services under this Contract shall be subject to the written approval of the Project Manager.

E. Grant Funded Projects: For grant-funded projects, the Consultant shall be responsible to comply with all grant requirements related to the Project. These may include, but shall not be limited to: Davis-Bacon Act, Endangered Species Act, Executive Order 11246 (Affirmative Action Requirements), Equal Opportunity, Competitive Solicitation, Record Retention and Public Access to Records, and Compliance Review.

F. Hours of Labor: The Consultant shall comply with all applicable provisions of California Labor Code Sections 1810 to 1817 relating to working hours. The Consultant shall, as a penalty to the Agency, forfeit $25.00 for each worker employed in the execution of the Contract by the Consultant or by any subcontractor for each calendar day during which such worker is required or permitted to work more than eight hours in any one calendar day and forty (40) hours in any one calendar week in violation of the provisions of the Labor Code.

G. Travel and Subsistence Pay: The Consultant shall make payment to each worker for travel and subsistence payments which are needed to execute the work and/or service, as such travel and subsistence payments are defined in the applicable collective bargaining agreements with the worker.

H. Liens: Consultant shall pay all sums of money that become due from any labor, services, materials or equipment furnished to Consultant on account of said services to be rendered or said materials to be furnished under this Contract and that may be secured by any lien against the Agency. Consultant shall fully discharge each such lien at the time performance of the obligation secured matures and becomes due.

I. Conflict of Interest: No official of the Agency who is authorized in such capacity and on behalf of the Agency to negotiate, make, accept or approve, or to take part in negotiating, making, accepting or approving this Contract, or any subcontract relating to services or tasks to be performed pursuant to this Contract, shall become directly or indirectly personally interested in this Contract.

J. Equal Opportunity and Unlawful Discrimination: During the performance of this Contract, the Consultant shall not unlawfully discriminate against any employee or employment applicant because of race, color, religion, sex, age, marital status, ancestry, physical or mental disability, sexual orientation, veteran status or national origin. The Agency is committed to creating and maintaining an environment free from harassment and discrimination. To accomplish these goals the Agency has established procedures regarding the implementation and enforcement of the Agency's Harassment Prohibition and Equal Employment Opportunity commitments. Please refer to Agency Policies A-29 (Equal Employment Opportunity) and A-30 Harassment Prohibition for detailed information or contact the Agency's Human Resources Administrator. A copy of either of these Policies can be obtained by contacting the Project Manager for your respective Contract. Please advise any of your staff that believes they might have been harassed or discriminated against while on Agency property, to report said possible incident to either the Project Manager, or the Agency's Human Resources Administrator. Please be assured that any possible infraction will be thoroughly investigated by the Agency.

K. Non-Conforming Work and Warranty: Consultant represents and warrants that the Consultant's Work and Documentation shall be adequate to serve the purposes described in the Contract. For a period of not less than one (1) year after acceptance of the completed Work, Consultant shall, at no additional cost to Agency, correct any and all errors of Consultant's Work or Documentation, regardless of whether any such errors or shortcoming is brought to attention of Consultant by Agency, or any other person or entity. Consultant shall within three (3) calendar days, correct any error or shortcoming that renders the Work or Documentation dysfunctional or unusable and shall correct other errors within thirty (30) calendar days after Consultant's receipt of notice of the error. Upon request of Agency, Consultant shall correct any such error deemed important by Agency in its reasonable discretion to Agency's continued use of the Work or Documentation within seven (7) calendar days after Consultant's receipt of notice of the error. If the Project Manager rejects all or any part of Consultant's Work or Documentation as unacceptable and agreement to correct such Work or Documentation cannot be reached without modification to the Contract, Consultant shall notify the Project Manager, in writing, detailing the dispute and reason for the Consultant's position. Any dispute that cannot be resolved between the Project Manager and Consultant shall be resolved in accordance with the provisions of this Contract.

L. Disputes:

1. All disputes arising out of or in relation to this Contract shall be determined in accordance with this section. The Consultant shall pursue the work to completion in accordance with the instruction of the Agency's Project Manager notwithstanding the existence of dispute. By entering into this Contract, both parties are obligated, and hereby agree, to submit all disputes arising under or relating to the Contract, which remain unresolved after the exhaustion of the procedures provided herein, to independent arbitration. Except as otherwise provided herein, arbitration shall be conducted under California Code of Civil Procedure Sections 1280, et. seq, or their successor.

2. Any and all disputes during the pendency of the work shall be subject to resolution by the Agency Project Manager and the Consultant shall comply, pursuant to the Agency Project Manager instructions. If the Consultant is not satisfied with any such resolution by the Agency Project Manager, they may file a written protest with the Agency Project Manager within seven (7) calendar days after receiving written notice of the Agency's decision. Failure by Consultant to file a written protest within seven (7) calendar days shall constitute waiver of protest, and acceptance of the Agency Project Manager's resolution. The Agency's Project Manager shall submit the Consultant's written protests to the General Manager, together with a copy of the Agency Project Manager's written decision, for his or her consideration within seven (7) calendar days after receipt of said protest(s). The General Manager shall make his or her determination with respect to each protest filed with the Agency Project Manager within ten (10) calendar days after receipt of said protest(s). If Consultant is not satisfied with any such resolution by the General Manager, they may file a written request for arbitration with the Project Manager within seven (7) calendar days after receiving written notice of the General Manager's decision.

3. In the event of arbitration, the parties hereto agree that there shall be a single neutral Arbitrator who shall be selected in the following manner:

   a. The Demand for Arbitration shall include a list of five names of persons acceptable to the Consultant to be appointed as Arbitrator. The Agency shall determine if any of the names submitted by Consultant are acceptable and, if so, such person will be designated as Arbitrator.

   b. In the event that none of the names submitted by Consultant are acceptable to Agency, or if for any reason the Arbitrator selected in Step (a) is unable to serve, the Agency shall submit to Consultant a list of five names of persons acceptable to Agency for ap-

pointment as Arbitrator. The Consultant shall, in turn, have seven (7) calendar days in which to determine if one such person is acceptable.

c. If after Steps (a) and (b), the parties are unable to mutually agree upon a neutral Arbitrator, the matter of selection of an Arbitrator shall be submitted to the San Bernardino County Superior Court pursuant to Code of Civil Procedure Section 1281.6, or its successor. The costs of arbitration, including but not limited to reasonable attorneys' fees, shall be recoverable by the party prevailing in the arbitration. If this arbitration is appealed to a court pursuant to the procedure under California Code of Civil Procedure Section 1294, et. seq., or their successor, the costs of arbitration shall also include court costs associated with such appeals, including but not limited to reasonable attorneys' fees which shall be recoverable by the prevailing party.

4. Joinder in Mediation/Arbitration: The Agency may join the Consultant in mediation or arbitration commenced by a contractor on the Project pursuant to Public Contracts Code Sections 20104 et seq. Such joinder shall be initiated by written notice from the Agency's representative to the Consultant.

M. Attorneys' Fees: In the event an action is commenced by a party to this Contract against the other to enforce its rights or obligations arising from this Contract, the prevailing party in such action, in addition to any other relief and recovery ordered by the court or arbitration, shall be entitled to recover all statutory costs, plus reasonable attorneys' fees.

11. INDEMNIFICATION: To the fullest extent permitted by law, Consultant shall indemnify and hold harmless and defend the Agency, its directors, officers, employees, or authorized volunteers, each of them from and against:

A. Any and all claims, demands, causes of action, damages, costs, expenses, losses or liabilities, in law or in equity, of every kind or nature whatsoever for, but not limited to, injury to or death of any person including Agency and/or Consultant, or any directors, officers, employees, or authorized volunteers of Agency or Consultant, and damages to or destruction of property of any person, including but not limited to, Agency and/or Consultant or their directors, officers, employees, or authorized volunteers, arising out of Consultant's work performed under this agreement, to the extent caused by the willful misconduct, or active negligence of Consultant;

B. Any and all actions, proceedings, damages, costs, expenses, penalties or liabilities, in law or equity, or every kind or nature whatsoever, arising out of, resulting from, or on account of the violation of any governmental law or regulation, compliance with which is the responsibility of the Consultant;

C. Any and all losses, expenses, damages (including damages to the work itself), attorneys' fees, and other costs, including all costs of defense, which any of them may incur with respects to the failure, neglect, or refusal or Consultant to faithfully perform the work and all of the Consultant's obligations under the agreement. Such costs, expenses, and damages shall include all costs, including attorneys' fees, incurred by the indemnified parties in any lawsuit arising under this agreement to which they are a party.

12. OWNERSHIP OF MATERIALS AND DOCUMENTS/CONFIDENTIALITY: The Agency retains ownership of any and all partial or complete reports, drawings, plans, notes, computations, lists, and/or other materials, documents, information, or data prepared by the Consultant and/or the Consultant's subcontractor(s) pertaining to this Contract. Said materials and documents are confidential and shall be available to the Agency from the moment of their preparation, and the Consultant shall deliver same to the Agency whenever requested to do so by the Project Manager and/or Agency. The Consultant agrees that same shall not be made available to any individual or organization, private or public, without the prior written consent of the Agency.

13. TITLE AND RISK OF LOSS:

A. Documentation: Title to the Documentation shall pass, subject to payment therefore, to Agency when prepared; however, a copy may be retained by Consultant for its records and internal use. Consultant shall retain such Documentation in a controlled access file, and shall not reveal, display or disclose the contents of the Documentation to others without the prior written authorization of Agency or for the performance of Work related to the PROJECT.

B. Material: Title to all Material, field or research equipment, subject to payment therefore, and laboratory models, procured or fabricated under the Contract shall pass to Agency when procured or fabricated, and such title shall be free and clear of any and all encumbrances. Consultant shall have risk of loss of any Material or Agency-owned equipment of which it has custody.

C. Disposition: Consultant shall dispose of items to which Agency has title as directed in writing by the Agreement Administrator and/or Agency.

14. PROPRIETARY RIGHTS:

A. Rights and Ownership: Agency's rights to inventions, discoveries, trade secrets, patents, copyrights, and other intellectual property, including the Information and Documentation, and revisions thereto (hereinafter collectively referred to as "Proprietary Rights"), used or developed by Consultant in the performance of the Work, shall be governed by the following provisions:

1. Proprietary Rights conceived, developed, or reduced to practice by Consultant in the performance of the Work shall be the property of Agency, and Consultant shall cooperate with all appropriate requests to assign and transfer same to Agency.

2. If Proprietary Rights conceived, developed, or reduced to practice by Consultant prior to the performance of the Work are used in and become integral with the Work or Documentation, or are necessary for Agency to have complete enjoyment of the Work or Documentation, Consultant shall grant to Agency a non-exclusive, irrevocable, royalty-free license, as may be required by Agency for the complete enjoyment of the Work and Documentation, including the right to reproduce, correct, repair, replace, maintain, translate, publish, use, modify, copy or dispose of any or all of the Work and Documentation and grant sublicenses to others with respect to the Work and Documentation.

3. If the Work or Documentation includes the Proprietary Rights of others, Consultant shall procure, at no additional cost to Agency, all necessary licenses regarding such Proprietary Rights so as to allow Agency the complete enjoyment of the Work and Documentation, including the right to reproduce, correct, repair, replace, maintain, translate, publish, use, modify, copy or dispose of any or all of the Work and Documentation and grant sublicenses to others with respect to the Work and Documentation. All such licenses shall be in writing and shall be irrevocable and royalty-free to Agency.

B. No Additional Compensation: Nothing set forth in this Contract shall be deemed to require payment by Agency to Consultant of any compensation specifically for the assignments and assurances required hereby, other than the payment of expenses as may be actually incurred by Consultant in complying with this Contract.

15. INFRINGEMENT: Consultant represents and warrants that the Work and Documentation shall be free of any claim of trade secret, trade mark, trade name, copyright, or patent infringement or other violations of any Proprietary Rights of any person.

Consultant shall defend, indemnify and hold harmless, Agency, its officers, directors, agents, employees, successors, assigns, servants, and volunteers free and harmless from any and all liability, damages, losses, claims, demands, actions, causes of action, and costs including reasonable attorney's fees and expenses to the extent of Consultant's negligence for any claim that use of the Work or Documentation infringes upon any trade secret, trade mark, trade name, copyright, patent, or other Proprietary Rights.

Consultant shall, at its expense and at Agency's option, refund any amount paid by Agency under the Contract, or exert its best efforts to procure for Agency the right to use the Work and Documentation, to replace or modify the Work and Documentation as approved by Agency so as to obviate any such claim of infringement, or to put up a satisfactory bond to permit Agency's continued use of the Work and Documentation.

16. NOTICES: Any notice may be served upon either party by delivering it in person, or by depositing it in a United States Mail deposit box with the postage thereon fully prepaid, and addressed to the party at the address set forth below:

Agency: Cameron B. Langner, Manager of Contracts,
Procurement and Facilities Management
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, California 91710

Consultant: James R. Hurst, Manager of Contracts
Parsons Water and Infrastructure Inc.
100 West Walnut Street
Pasadena, California 91124

Any notice given hereunder shall be deemed effective in the case of personal delivery, upon receipt thereof, or, in the case of mailing, at the moment of deposit in the course of transmission with the United States Postal Service.

17. SUCCESSORS AND ASSIGNS: All of the terms, conditions and provisions of this Contract shall inure to the benefit of and be binding upon the Agency, the Consultant, and their respective successors and assigns. Notwithstanding the foregoing, no assignment of the duties or benefits of the Consultant under this Contract may be assigned, transferred or otherwise disposed of without the prior written consent of the Agency; and any such purported or attempted assignment, transfer or disposal without the prior written consent of the Agency shall be null, void and of no legal effect whatsoever.

18. PUBLIC RECORDS POLICY: Information made available to the Agency may be subject to the California Public Records Act (Government Code Section 6250 et seq.) The Agency's use and disclosure of its records are governed by this Act. The Agency shall use its best efforts to notify Consultant of any requests for disclosure of any documents pertaining to Consultant.

In the event of litigation concerning disclosure of information Consultant considers exempt from disclosure; (e.g., Trade Secret, Confidential, or Proprietary) Agency shall act as a stakeholder only, holding the information until otherwise ordered by a court or other legal process. If Agency is required to defend an action arising out of a Public Records Act request for any of the information Consultant has marked "Confidential," "Proprietary," or "Trade Secret, " Consultant shall defend and indemnify Agency from all liability, damages, costs, and expenses, including attorneys' fees, in any action or proceeding arising under the Public Records Act.

19. RIGHT TO AUDIT: The Agency reserves the right to review and/or audit all Consultants' records related to the Work. The option to review and/or audit may be exercised during the term of the Contract, upon termination, upon completion of the Contract, or at any time thereafter up to twelve (12) months after final payment has been made to

Consultant. The Consultant shall make all records and related documentation available within three (3) working days after said records are requested by the Agency.

20. INTEGRATION: The Contract Documents represent the entire Contract of the Agency and the Consultant as to those matters contained herein. No prior oral or written understanding shall be of any force or effect with respect to those matters covered by the Contract Documents. This Contract may not be modified, altered or amended except by written mutual agreement by the Agency and the Consultant.

21. GOVERNING LAW: This Contract is to be governed by and constructed in accordance with the laws of the State of California.

22. TERMINATION FOR CONVENIENCE: The Agency reserves and has the right to immediately suspend, cancel or terminate this Contract at any time upon written notice to the Consultant. In the event of such termination, the Agency shall pay Consultant for all authorized and Consultant-invoiced services up to the date of such termination.

23. FORCE MAJEURE: Neither party shall hold the other responsible for the effects of acts occurring beyond their control; e.g., war, riots, strikes, natural disasters, etcetera.

24. NOTICE TO PROCEED: No services shall be performed or furnished under this Contract unless and until this document has been properly signed by all responsible parties and a Notice to Proceed order has been issued to the Consultant.

IN WITNESS WHEREOF, the parties hereto have caused the Contract to be entered as of the day and year written above.

INLAND EMPIRE UTILITIES AGENCY:		PARSONS WATER & INFRASTRUCTURE, INC.:	
Richard W. Atwater Chief Executive Officer General Manager	11/19/03 (Date)	David L. Backus President	11-18-03 (Date)

EXHIBIT A

SECTION A –REVISED SCOPE OF WORK

The scope of work presented herein is based upon the RFP requirements dated June 14, 2003, subsequently modified to reflect our recent discussions with the Agency. The necessary surveying and geotechnical work will be performed by the Agency or others. Parsons will provide the scope of work for these services. This revised scope of work includes additional services requested by the Agency:

- SCAQMD Air Permitting Services
- Preparation of RMP and PSM Documents
- CEQA Mitigation Negative Declaration
- Power System Analysis and SCE Coordination

The scope of work includes preparation of a single bid package with milestones and early completion of the primary effluent pump station.

The scope of work is organized around tasks as shown in Table A-1:

TASK 1: PROJECT MANAGEMENT AND COMMUNICATION (PRE-DESIGN & DESIGN)

The objectives of this task are to adequately involve the Agency staff throughout the entire project and to monitor and control the project schedule, budget, staff resources, and technical activities so that the project is completed on schedule and within budget.

SUBTASK 1.1: CONDUCT PRE-DESIGN KICKOFF MEETING AND PREPARE PROJECT MANAGEMENT PLAN

A kickoff meeting will be held to introduce the project team to the Agency and confirm the scope of work and schedule. A Project Management Plan will be prepared to serve as a roadmap, identifying the sequence of activities, including reviews and progress reporting. The Project Management Plan will address project implementation approach, staffing, organization, project record keeping, document control, quality control and quality assurance responsibilities, and milestones including technical committee meetings, project budget and schedule.

Deliverable:

- ➤ Project Management Plan including one review and approval cycle.

Table A-1 – Parsons' Expanded Scope of Work Outline

1. PROJECT MANAGEMENT AND COMMUNICATION
   - Task 1 Project Management and Communication (Predesign & Design)
     - Subtask 1.1 Conduct Predesign Kickoff Meeting and Prepare Project Management Plan
     - Subtask 1.2 Conduct Monthly Progress Meetings and Prepare Project Progress Reports
     - Subtask 1.3 Conduct Workshops on Key Issues
     - Subtask 1.4 Conduct Presentations
     - Subtask 1.5 Ensure Quality Control
       - 1.5.1 Conduct Discipline Check
       - 1.5.2 Conduct Interdiscipline Check

2. PREDESIGN PHASE
   - Task 2 Perform Preliminary Design for Cogeneration Facility
     - Subtask 2.1 Evaluate Key Design Issues
     - Subtask 2.2 Prepare Preliminary Design Report
     - Subtask 2.3 Provide CEQA Assistance
       - 2.3.A Perform Environmental Review (Optional)
     - Subtask 2.4 Provide Permitting Assistance
       - 2.4.A Perform Permitting Services (Optional)
       - 2.4.A.1 Air Permitting- SCAQMD
       - 2.4.A.2 Environmental Review
       - 2.4.A.3 Preparation of Other permits (Non Air Permit)
     - Subtask 2.5 Prepare RMP and PSM Documents (Optional)
   - Task 3 Preselection/Prepurchase of Major Equipment

3. DETAILED DESIGN PHASE
   - Task 4 Prepare Final Design and Bid Document
     - Subtask 4.1 Prepare 30 Percent Plans and Specifications
     - Subtask 4.2 Prepare 50 Percent Plans and Specifications
     - Subtask 4.3 Conduct Constructability and Internal Value Engineering
     - Subtask 4.4 Prepare 85 Percent Plans and Specifications
       - 4.4.1 Conduct Detailed Quality Control Check
     - Subtask 4.5 Prepare Final (100 Percent) Plans and Specifications
     - Subtask 4.6 Update Construction Cost Estimate and Schedule

4. CONSTRUCTION PHASE
   - Task 5 Provide Services During Bid and Award Phase
     - Subtask 5.1 Attend Prebid Conference
     - Subtask 5.2 Prepare Addenda
   - Task 6 Provide Services During Construction
     - Subtask 6.1 Attend Preconstruction Conference
     - Subtask 6.2 Review Shop Drawings and Other Documents
     - Subtask 6.3 Provide Plan Clarifications
     - Subtask 6.4 Provide Change Order Assistance
     - Subtask 6.5 Attend Construction Meetings and provide Specialty Inspections
     - Subtask 6.6 Provide Technical Assistance for Claim Avoidance
     - Subtask 6.7 Prepare "As Built" Drawings
     - Subtask 6.8 Participate in Testing and Startup
     - Subtask 6.9 Prepare Punch list and Attend Two Walkthroughs
     - Subtask 6.10 Prepare Operation and Maintenance Manuals

SUBTASK 1.2: CONDUCT MONTHLY MEETINGS AND PREPARE PROJECT PROGRESS REPORTS

Parsons will conduct monthly progress meetings with the Agency staff throughout the pre-design phase and detailed design phase. In addition to monthly progress meetings, Parsons will conduct coordination meetings as needed. Parsons will provide project status reports to the Agency at the monthly meetings. These reports will describe the month's activities, work planned for the next period, estimated progress, and areas of concern. They will also present cumulative expenditures in tabular and graphic formats. The fee estimate includes four monthly and coordination meetings during the pre-design phase and three meetings with the permit regulatory agencies: South Coast Air Quality Management District, Regional Water Quality Control Board, and the local Fire Department. The fee estimate includes six monthly and coordination meetings during the design phase.

Deliverable:

- Project Status Reports for ten meetings

SUBTASK 1.3: CONDUCT WORKSHOPS ON KEY ISSUES

During the pre-design phase, Parsons will conduct two workshops with Agency staff. Two monthly meetings will be extended to daylong workshops. The first workshop will be dedicated to obtaining Agency input, evaluating the four key process issues, discussing concerns, and identifying processes for further consideration and design. The second workshop will be held to discuss the draft Preliminary Design Report (PDR). This interaction will help in effectively applying the Agency's goals to the key issues being addressed and in ensuring that the concerns of the Agency staff are addressed.

Deliverable:

- Meeting minutes for two workshops

SUBTASK 1.4: PRESENTATIONS

Parsons will make three formal presentations: to the Regional Technical Committee, to the Regional Policy Committee, and to the Agency's Board. The presentations will be prepared in PowerPoint in close coordination with the Agency. Parsons will be responsible for all handouts for presentations. The Project Manager, Lead Mechanical Engineer, Permitting Engineer, and others will attend the Board presentations as necessary.

Deliverable:

- Presentations for three meetings

SUBTASK 1.5: ENSURE QUALITY CONTROL

Parsons will establish customized QA/QC procedures for this project. A Technical Review Committee will meet once during the pre-design phase and two times during the detailed design phase of the project to review interim analyses and actively participate in making recommendations as the work progresses. The Agency staff will be invited to participate in the QC process. This approach will ensure that the project incorporates proven technologies, engineering excellence, and cost-effective methods.

1.5.1 Conduct Disciplinary Check

Before the 30%, 50%, and 85% submittals, a thorough disciplinary check will be performed internally at Parsons. Personnel involved in the disciplinary check will represent all disciplines active in the design. The disciplinary check review comments will be documented and addressed in writing by lead discipline engineers.

1.5.2 Conduct Interdisciplinary Check

Before the 85% submittal, a thorough interdisciplinary check will be performed internally at Parsons. Personnel involved in this check will be experienced individuals with comprehensive knowledge of interfaces between disciplines and implications of specific trades on the remaining disciplines. Most of the check participants have Value Engineering experience to provide enhanced review value to this project.

Before the 50% submittal, Parsons will also conduct a constructability review as described in Subtask 5.3. Parsons will provide summary of the constructability review at this stage.

The interdiscipline check review comments, including the constructability review comments, will be documented and addressed in writing by lead discipline engineers.

TASK 2: PERFORM PRELIMINARY DESIGN FOR COGENERATION FACILITY

Parsons will perform the preliminary design in two steps:

- Step 1 – Evaluate four key design issues – Subtask 2.1 including the deliverables identified therein
- Step 2 – Prepare the Pre-design Report (PDR) – Subtask 2.2 including the deliverables identified therein

SUBTASK 2.1: STEP 1 – EVALUATE KEY DESIGN ISSUES

Parsons will evaluate in detail the following four key design issues:

- Applicability of Organic Rankine Bottoming Cycle (ORC) System
- Applicability of Thermal Ice Storage (TIS) System
- Engine Generator System Configuration
- Natural Gas Compression and Air Blending System

Applicability of ORC System

Parsons will perform the ORC equipment research and technical analysis, including safety evaluation. An organic working fluid is used instead of steam, which is the most common working fluid in Rankine

cycle applications. The objective is to use the excess recovered engine heat that is not used in the absorption chillers to generate additional electricity.

Parsons will carefully evaluate the track record of the ORC units, the number of installations (focusing on installations in California), and pool of reliable manufacturers. Parsons' mechanical engineers will visit the closest identified installation of the ORC; gather relevant information, and interview operating personnel. The findings of this field study will be included in Technical Memorandum No.2.

Parsons will also evaluate the potential for using a Stirling engine for heat recovery. The Stirling engine uses air as its working fluid; extensive design and development efforts have been underway recently to improve its efficiency and reliability.

Because these technologies are new and innovative, Parsons will carefully look into their performance and ensure that the potential vendors take full responsibility for the committed performance and SCAQMD compliance.

Applicability of Thermal Ice Storage (TIS) System

Parsons will evaluate two primary types of TIS systems, defined by the media used to store the cooling capacity: chilled water and ice.

If proven economical, a separate, package-type TIS system will be provided in adequate size supported by payback analysis. Two sizing alternatives for the TIS system will be evaluated: a smaller one for a single 30-ton chiller and a larger one for all four 30-ton chillers. The TIS will be incorporated into building energy management system and will be controlled by that system to reduce cooling load peaks. The technical and economical analysis will be performed for both alternatives.

Parsons will review the existing chiller performance and features in greater detail to determine if they are suitable for ice production. Preliminary evaluation during the site visit revealed that the existing absorption chillers are not suitable to support the thermal ice storage system.

Because these technologies are new and innovative, Parsons will carefully look into their performance and ensure that the potential vendors take full responsibility for the committed performance and SCAQMD compliance.

Engine Generator System Configuration

Parsons will evaluate in detail Alternative No. 5 (two 2,000-kW engine configuration) and Alternative No. 6 (three 1,000-kW engine configurations) to select the most viable and cost-effective alternative. This analysis will consider the major equipment associated with the engine generator systems, including heat recovery, emission control, auxiliary equipment, electrical, SCADA, fuel gas compression, and building size. Parsons will contact all qualified vendors to collect equipment specifications, capital cost, fuel consumption, O&M costs, parts replacement, etc. The evaluation criteria will include, but will not be limited to flexibility to meet varying power demand during the life of the engines, expandability, capital cost, O&M costs, present worth cost, and fuel consumption at 50%, 75%, and 100% loads. A detailed evaluation matrix will be prepared and discussed with the IEUA to select the most suitable configuration.

Natural Gas Compression and Air Blending System

Parsons will prepare the pre-design of new gas compression system, which will tie in with the existing compressed gas systems as required. It is our understanding that the existing 20-psi natural gas line will not be sufficient to meet the fuel demand of the proposed cogeneration facility. Parsons will

evaluate the new large natural gas pipeline with increased pressure. Parsons will coordinate with the local gas company for sizing, pressure, and meter location. All efforts will be made to avoid excessive expenditures in running the gas line from a distant location.

Parsons will evaluate the existing digester gas compression system located at RP-2, consisting of two reciprocating gas compressors and a storage tank, and the 90-psig gas compressors at RP-5 (Synagro Facility) to supply manure gas for the two gas engines at the Desalter Plant. Parsons understands that the RP-5 manure digester gas system, the RP-2 gas compression system, and the Desalter Plant gas system will all be connected to a 70-psig working gas pressure piping network. We also understand that IEUA will run a 4-inch digester gas pipeline from RP-2 to RP-5 adjacent to the new cogeneration building to serve the new gas engines for the RP-5 Renewable Energy project.

If required, Parsons will include a digester gas purification system consisting of a moisture eliminator and hydrogen sulfide absorber. The purification system will remove moisture and hydrogen sulfide from the digester gas stream. The combination of moisture and hydrogen sulfide produces sulfuric acid, which is the prime contributor to corrosion of piping and equipment.

Parsons will review the existing digester gas production at the IEUA facilities and develop a best available approach for the design of the new system to supply either digester gas or natural gas to any of the new gas engines. The new natural gas/air blending system will include storage/surge tanks along with gas compressors to suit the new gas engine requirements when running on natural gas. The ultimate goal for the compressed gas system is to supply constant heating value fuel gas to the engines (about 600 Btu/cu ft) all the time without the need to switch from the digester gas fuel to natural gas and without the generator's interface. Parsons will investigate if the new gas engines can be permitted to run on a mixture of diluted natural gas (blended with air) and digester gas as currently operating at RP-2 and the Desalter.

Step One deliverables will include up to a full-day workshop and summary report with final recommendations supported by technical and commercial assessments. The summary report will include technical memoranda on all four key issues discussed above.

Preliminary design will include space allocation for 250 KW fuel cell in future and required future interconnections, including but not limited to the gas, water, heat recovery piping. The Agency will provide Parsons with a technical evaluation of the fuel calls and financial analysis for inclusion into the Preliminary Design Report. The fuel gas cleaning and treatment system analysis during pre-design will include its use for the IC engines as well as fuel cells.

It is Parsons' understanding that the fuel cells will be installed in future under a separate project.

Deliverables:

- Summary Report consisting of TM-2, TM-3, TM-4, and TM-5: 15 copies (See Subtask 3.2 for TM listings)

SUBTASK 2.2: STEP 2 – PREPARE PRELIMINARY DESIGN REPORT

Step two will include preparation of the PDR. Parsons will conduct one up to full-day workshop to discuss findings of the draft PDR with the Agency's personnel. The final PDR, as approved by the Agency, will consist of the following:

- Executive Summary
- **TM-1 Fuel Sources and Power Demand Criteria**
- TM-2 Applicability of Organic Rankine Bottoming Cycle
- TM-3 Applicability of Thermal Ice Storage
- TM-4 Engine Generator Subsystem
- TM-5 NG Compression and Air Blending Subsystem
- TM-6 DG Purification, Compression and Blending Subsystem for IC Engines and Fuel Cell
- **TM-7 Heat Recovery System**
- **TM-8 Primary Effluent Pump Station**
- TM-9 Process Flow Diagram and Process Description
- TM-10 Design Criteria and Equipment List
- TM-11 SCAQMD Requirements and Emission Control Equipment
- TM-12 Electrical System Interface Criteria and Single Line Diagram
- **TM-13 SCADA System and RP-5 Interface Criteria**
- TM-14 Preliminary Process and Instrumentation Diagrams (P&IDs)
- TM-15 Equipment Layout and Site Development Requirements
- **TM-16 Cogeneration Operational Philosophy**
- TM-17 Specifications and Drawing List
- TM-18 Preliminary Project Cost and Schedule
- **Appendix A Fuel Cell System Evaluation and Financial Analysis** (provided by IEUA)

Some of the technical Memoranda will be combined as deemed appropriate by the Agency and Parsons.

The following key design elements will be included in separate appendixes to the PDR:

- Pertinent SCAQMD, RWQCB, and Fire Department regulations
- Equipment List and Catalog Data Sheets
- Preliminary List of Drawings and Specifications

Parsons' PDR approach has a more expanded scope than that required by the RFP. We recommend that several additional evaluations be conducted in order to compile a comprehensive PDR that leads to a more cost-effective design and selection of equipment.

Under TM-12, Parsons will coordinate with the local utility company, Southern California Edison the interface tie-in point of connection and obtain required protection relay scheme.

Parsons will prepare a preliminary project schedule covering all components of the project, including design, bid, award, permitting, and phased construction activities. Equipment delivery time, regulatory permits, reviews, and other activities that could affect the project completion date will be identified.

Individual major items will break down a preliminary construction cost estimate. It will be a "Class C" estimate according to the American Association of Cost Engineers guidelines. All costs will be in current dollars, referenced to the current Engineering News Record Construction Cost Index.

SUBTASK 2.3: PROVIDE CEQA ASSISTANCE

We understand that the Program EIR (prepared jointly by Tom Dotson & Associates and Parsons in 2002) for the entire Wastewater Facilities Plan was recently adopted by the Agency. The Program EIR includes all RP-5 facilities. We believe that there will be minimum need to prepare supplementary

CEQA I documentation. Parsons will assess the need for any supplementary CEQA I documentation and will provide necessary data; and Agency will prepare the document. Parsons will implement the adopted environmental mitigation measures from the CEQA document and controlling agency permitting requirements in the design. Any mitigation measures associated with the offsite work are not included in the scope of work and fee estimate.

Deliverable:

- Report on Supplementary CEQA Needs Assessment

SUBTASK 2.3A: PERFORM ENVIRONMENTAL REVIEW (OPTIONAL)

Parsons will provide engineering services related to the environmental review for this project as outlined below. The estimated engineering services fee will be inclusive of the fee needed for Task 2.3.

We understand that the Program EIR (prepared jointly by Tom Dotson & Associates and Parsons in 2002) for the entire Wastewater Facilities Plan was recently adopted by the Agency. The Program EIR includes all RP-5 facilities. Parsons will provide the environmental review report, develop mitigation measures and incorporate them into detailed design. Parsons will also provide the required information to Department of Energy to undertake its review for NFPA compliance.

Parsons assumes that a Mitigated Negative Declaration (MND) will provide sufficient documentation under CEQA for the proposed project. The following environmental factors would be potentially affected by this project: hazards and hazardous materials, water quality, air quality, geology/soils, land use, noise, and transportation/traffic (especially during the construction of the project).

The following activities are included in the scope of work:

1. Meetings with IEUA and select agencies where necessary to confirm information for the Initial Study/MND.
2. Conducting environmental studies, as needed, to obtain data for the Initial Study/MND.
3. Preparation of draft and final Initial Study/MND documents, structured around the CEQA checklist.

Deliverable:

- CEQA Mitigating Negative Declaration Documentation

SUBTASK 2.4: PROVIDE PERMITTING ASSISTANCE

Parsons will evaluate the current SCAQMD, RWQCB, and Fire Department permit requirements for the construction of the cogeneration plant. Parsons will provide necessary technical assistance and data to the Agency for these and other permits needed for this project. Parsons understands that the Agency will lead the permitting task and that permit applications will be filed in the name of the Agency at its expense. Parsons' role will be limited to assisting in completing the applications and providing the necessary project design related technical support data. Any required studies and modeling – including

dispersion analysis and predictive method modeling (if required), process safety management plan (if required), and risk management plan (if required) – would be performed by the Agency.

Deliverables:

- Draft Preliminary Design Report - 15 copies
- Final PDR - 10 copies, 2 CDs with electronic file Draft calculations/final calculations – 3 copies
- SCAQMD, Fire Department, and RQWCB permits and CEQA data input

SUBTASK 2.4.A: PERFORM PERMITTING SERVICES (OPTIONAL)

Parsons will provide engineering services to obtain required permits for this project as outlined below. The estimated engineering services fee will be inclusive of the fee needed for Task 2.4.

This proposed scope of work is for Alternative No. 6, which will include three 1,000 kW lean gas engine generator sets. In addition, organic bottoming cycle shall be installed on all three engines exhaust, with three heat recovery modules and one turbo-generator, for additional power. Based on a telephone conversation with Ormat, it is expected that the facility may store and handle more than 10,000 pounds of pentane, a flammable substance, which will be subject to USEPA and California Risk Management Plan (RMP) and Cal/OSHA Process Safety Management Program (PSM) Regulations.

This proposal is based on the assumption that Parsons will develop RMP and PSM documents, and Mitigated Negative Declaration (MND) document, permits from the Regional Water Quality Control Board and Fire Department, in addition to the air permit.

TASK 2.4.A.1: AIR PERMITTING – SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

The following six sub-tasks will be performed as part of the preparation of the air permit application for the South Coast Air Quality Management District (SCAQMD).

Sub-Task 2.4.A.1.1: Identify and Summarize Applicable Rules and Regulations – Parsons will identify all the applicable rules and regulations for the construction and operation of the engine generator sets and other air pollutant sources from the proposed project. It is expected that the facility will be subject to SCAQMD Rules 431.1, 1110.2 (or Regulation XX), Regulation XIII, Rule 1401, and Regulation XXX. The facility is not expected to be subject to the United States Environmental Protection Agency (USEPA) Prevention of Significant Deterioration (PSD) analysis.

Sub-Task 2.4.A.1.2: Perform Regulatory Analysis - As part of the regulatory analysis, Best Available Control Technology (BACT) evaluation will be performed for the complete power generating system (cogeneration facility). This analysis will be performed in consultation with the SCAQMD and will take into account the efficiency of the cogeneration system and sulfur content of the fuel proposed to be used. Early determination of BACT will be critical in finalizing the criteria pollutant emissions and also in estimating the emission reduction credit (ERC) requirements for the project. After estimating the emission offset requirements, Parsons will identify the sources from where IEUA can procure the offsets.

Sub-Task 2.4.A.1.3: Perform Criteria Pollutant Air Dispersion Modeling Analysis – As required by Regulation XIII (and also may be under Rule 2005), air quality impact analysis will be performed to estimate the increase in ambient air concentrations of various criteria pollutants emitted by the project during the operational phase. These estimated ambient air concentrations will be compared with the SCAQMD recommended ambient air concentration significance thresholds. Parsons will perform air dispersion modeling using the USEPA and SCAQMD approved air dispersion model (ISCST3) with appropriate meteorological data.

Sub-Task 2.4.A.1.4: Perform Air Toxics Health Risk Assessment – As required by Rule 1401, emissions of Rule 1401 listed air toxics will be estimated. This data will be used to perform an air toxics health risk assessment to estimate the increase in carcinogenic risk and the acute and chronic hazard indices during the operational phase. The predicted carcinogenic risk and the hazard indices will be compared with the SCAQMD recommended significance thresholds. Parsons will perform air dispersion modeling using the ISCST3 model and ACE2588, health effects model. The output of the ISCST3 model will form the input to the ACE2588 model.

Sub-Task 2.4.A.1.5: Prepare Draft and Final Air Permit Application – Parsons will prepare the complete draft permit application, which will include the results of the analysis performed under Sub-Tasks 1 through 4, the SCAQMD required permit application forms, and submit to the IEUA for review comments. Parsons will incorporate IEUA suggestions and prepare the final air permit application, which will be submitted to the SCAQMD by IEUA.

Sub-Task 2.4.A.1.6: Attend Meetings with IEUA and SCAQMD – Parsons will attend meetings with the involved parties during the design phase either by the teleconference or by physical meetings. Parsons will also meet with the SCAQMD prior to the submission of the permit application. Parsons will respond to all the SCAQMD comments after the submission of the permit application and also meet with the SCAQMD, if required.

TASK 2.4.A.2: ENVIRONMENTAL REVIEW

As requested, Parsons will provide support in the preparation of the environmental review report, development of mitigation measures and their incorporation into the project design. Parsons will also provide the required information to Department of Energy to undertake its review for NFPA compliance. It is expected that a Mitigated Negative Declaration (MND) document will be required for the project. It is also expected that the following environmental factors would be potentially affected by this project: (1) hazards and hazardous materials, (2) water quality, (3) air quality, (4) geology/soils, (5) land use, (6) noise, and (7) transportation/traffic (especially during the construction of the project). Parsons expects that ambient noise data near the project site would be available; thus, no noise monitoring would be required as part of this task.

TASK 2.4.A.3: PREPARATION OF OTHER PERMITS (NON AIR PERMIT)

In addition to air permit from the SCAQMD, the project will require permits from the Regional Water Quality Control Board and Fire Department. Parsons will prepare the NPDES permits for construction and operation and assist IEUA in obtaining the permits before the start of the construction of the project. These permit documents will include the Storm Water Pollution Prevention Plans (SWPPPs). Fire Department will require the completion of the RMP prior to bringing pentane to the project site (above the threshold quantity of 10,000 pounds). In addition, Fire Department will require hazardous materials compliance plan. NFPA 820 compliance has been addressed by mechanical discipline. Parsons will prepare these documents and submit to the Fire Department.

- preparation of a draft report and final air permit application,
- preparation of the RMP and PSM documents.

Parsons will provide necessary technical assistance and data to the Agency for these and other permits needed for the project. Parsons understands that the Agency will lead the permitting task and that permit applications will be filed in the name of the Agency at its expense. Parsons' role will include completing the applications and providing the necessary project design related technical support data, dispersion analysis and predictive method modeling, process safety management plan, and risk management plan.

TASK 2.5: PREPARATION OF RMP AND PSM DOCUMENTS

The following six sub-tasks will be performed as part of the preparation of RMP and PSM documents.

Sub-Task 2.5.1: Perform Process Hazard Analysis

A major item in RMP and PSM Program is the performance of a Process Hazard Analysis (PHA), which has to be developed using appropriate methodologies. It has to address process hazards, previous incidents, engineering and administrative controls, including detection and early warning systems, consequences of failure of these controls, facility siting, human factors, and a qualitative evaluation of the effects of failure of controls on employees in the workplace.

Various procedures are available to perform a Process Hazard Analysis. These vary, in order of increasing complexity, from streamlined "What If" and "Checklists" procedures to logically organized "Hazard and Operability (HAZOP)" studies, or semi-quantitative "Fault Tree" analyses. While all of these procedures have been applied to various processes, the HAZOP procedure is the one most commonly followed for complex systems, such as the pentane system. The goal is to systematically identify hazards or operational problems at a facility and to evaluate the likelihood and consequences of a hazardous material release. The HAZOP technique, originally developed by the American Institute of Chemical Engineers (AIChE)* uses the team approach to identify hazards and operability problems which may undermine the ability to maintain safe conditions at all times. Potential deviations from intended plant design and operation are identified through a systematic process based on the review of physical parameters (e.g. flow, temperature, and pressure) and process conditions (e.g. low, high, excess). Possible accident sequences due to equipment failure or human error, consequences, and methods for risk reduction are developed. Existing safety items and suggested actions concerning design, equipment, maintenance, operations, procedures and training are tabulated concurrently. Parsons is proposing to use the HAZOP technique for performing the PHA for the IEUA pentane handling system.

Sub-Task 2.5.2: Perform Seismic Assessment

An earthquake impact (seismic) evaluation includes two parts: a seismicity analysis, and a structural engineering analysis. In the seismicity analysis, five subtasks are involved: (1) a comprehensive review of all available geologic and geotechnical reports, (2) identification of faults that may impact the facilities from historical records, including the earthquake epicenters of magnitude 6.0 or greater, and their distance from the facility, (3) estimation of surface acceleration at the facility, (4) evaluation of liquefaction potential, and (5) definition of landslide potential from ground shaking. A structural engineering analysis has to be performed for buildings housing the chemical systems, vessels, tanks, pipe supports, and their foundations. For the seismic assessment, three tasks will be performed: (1) perform seismicity analysis; (2) review the seismic design of the pentane handling system, including anchoring, bracing, and tank supports; and (3) develop recommended actions, if any are found to be required.

Sub-Task 2.5.3: Perform Hazard Assessment

*AIChE Center for Process Safety (Battelle Columbus), *Guidelines for Hazard Evaluation Procedures*, Second Edition, New York, NY, 1992.

The hazard assessment includes an estimate of the possible release quantities for worst case and alternative release scenarios, a determination of downwind effects, and a definition of the potential exposure to affected populations. These items constitute an "Offsite Consequence Analysis."

An Offsite Consequence Analysis (OCA) is based on the concepts of endpoint, level of concern, and vulnerable zone. RMP regulations provide specific instructions for OCA performance. The level of concern or "flammable endpoint" as defined by the USEPA will be used for this offsite consequence analysis.

The vulnerable zone is the area over which the flammable endpoint distance will extend. A circle represents it with its center at the point of release and a radius corresponding to the distance to the flammable endpoint. Important factors are an estimate of the population residing within this circle that could be potentially affected and the presence of public institutions, such as schools, hospitals, parks, and public areas.

The flammable endpoint distance will be estimated using the USEPA developed RMP*Comp model. Parsons will also prepare consequence analysis maps as required by the local Administering Agency (San Bernardino County Fire, Hazardous Materials Division).

Sub-Task 2.5.4: Perform Hazard Analysis

California Administering Agencies require performing a hazard (risk) analysis for each accidental release considered, based on the results of process hazard, external events, and offsite consequence analysis. Risk analysis conclusions are drawn from a comparison of the frequency ranking (probability of occurrence of the release scenario) and critically ranking (severity of consequences caused). Parsons will perform the hazard analysis for the pentane system following the San Bernardino County Fire, Hazardous Materials Division guidance document.

Sub-Task 2.5.5: Prepare RMP

A summary of the technical studies performed for the preparation of the Risk Management Program, and some additional information has to be assembled in an "RMP Document." The contents of a CalRMP are listed below.

1. Executive Summary
2. Registration
3. Risk Communication Supplement
    a. Vulnerability Zone Analysis
    b. Regulated Substance Risk Mitigations with Implementation Schedule
    c. Detection and Monitoring Devices
4. Certification

Parsons will prepare the complete CalRMP ready for submission to the Administering Agency and also federal RMP for submission to the USEPA.

Sub-Task 2.5.6: Prepare PSM

Parsons will prepare the PSM document which will include 13 elements, including the results of PHA performed under sub-task, operating procedures, emergency response program, mechanical integrity, pre-startup safety, management of change, and hot work permits.

Deliverables:

- Draft Preliminary Design Report - 15 copies
- Final PDR - 10 copies, 2 CDs with electronic file Draft calculations/final calculations – 3 copies
- SCAQMD, Fire Department, USEPA, Cal/OSHA and RQWCB permits and CEQA Documentation

TASK 3: PRESELECTION / PREPURCHASE OF MAJOR EQUIPMENT

Parsons will prepare the following four prepurchase specifications/bid documents for the major equipment involved in this project.

- Primary effluent pumping units and electrical equipment
- Major equipment such as internal combustion engines with auxiliaries, heat recovery system including the heat recovery silencers, load balancing radiator and jacket water heat exchangers, emission control system, and switchgear
- ORC and auxiliary equipment
- Tilt-up building

Parsons will provide the following services for the prepurchase of major equipment:

- Preparation of specifications/bid documents, which will include performance, permit compliance, and evaluation criteria. The evaluation criteria will include, but will not be limited to, the capital, O&M, and 10-year life-cycle costs; fuel consumption; power output; heat recovery; and permit compliance
- Technical evaluation of bids including conformance with the selection criteria and present worth analysis (legal and contractual evaluation of bids will be conducted by the Agency)
- Technical assistance in negotiation and selection of a qualified bidder
- Shop drawing review
- Response to the bidders' technical questions
- Witness factory testing. One site visit per the pre-purchase bid package. Two key Parsons staff will visit along with the Agency staff. Agency or the supplier will pay for travel and lodging. Parsons' fee estimate considers two days per field test.

Specifications and drawings for performance requirements for the major equipment, ORC, and TIS will include strict performance requirements including five years extended warranty to be met by the equipment suppliers. Especially for the ORC and TIS systems, which are innovative and still developing, the performance requirements will require equipment suppliers to be fully responsible for the performance and permit compliance. Digester gas quality data for over one year will be complied and provided to the bidders as basis of fuel characteristics.

Parsons understands that its scope of services includes neither (1) preparation of procurement documents (other than the aforesaid specifications and drawings) or procuring any equipment

(including, but not limited to, the ORC and TIS), materials, or supplies for the project; nor (2) paying for any such procured equipment, materials, or supplies.

TASK 4: PREPARE FINAL DESIGN AND BID DOCUMENTS

The Parsons Team will prepare construction specifications using the Parsons' Master Specifications and the Agency's Standard General Conditions, bid documents, notice to bidders, conditions of the contract, bidding requirements, and technical specifications and drawings to produce a complete bidding document to conform to Agency's requirements.

Drawings will be reduced to 11" by 17" for binding. Final full-size drawings will consist of 22" x 34" Mylar (4-mil double matte) copies of the drawings. The final product will include an electronic copy on CD ROM with one set of reports and specifications in MS Word 2000 and drawings in AutoCAD 2000 format.

The RP-5 Renewable Energy Efficiency Project will be completed assuming an accelerated design and construction schedule. The completion of the construction is set for August 2005 to meet Department of Energy funding requirements.

The following design basis/assumptions have been made to develop the scope, fee estimate, sheet count, level of effort, and schedule for this project.

Key Design Basis/Assumptions

Considering our understanding of project needs, the following key design basis/assumptions have been made to develop the design scope, work effort, sheet count, fee estimate, and design schedule:

- Each submittal will be reviewed by the Agency and DOE, simultaneously, within a fifteen (15) consecutive calendar day period.
- Alternative No. 5 or 6 will be selected for the design of the gas engine generator, auxiliary systems, and cogeneration building.
- 4-inch-diameter digester gas pipeline for RP-2 to RP-5 will be designed by the IEUA; therefore, it is not included in Parsons' scope of work.
- New larger natural gas line with meter within the RP-5 boundaries is included.
- ORC and TIS will be shown on the design document as vendor-furnished complete equipment.
- Preparation of the CEQA mitigation measures and their incorporation into detailed design are included.
- Design of the continuous emission management system (CEMS) is included in Parsons' scope of work.
- Design of digester gas purification system suitable for IC engines and fuel cells is included in Parsons' scope of work.
- Cogeneration and its auxiliary system TIS and ORC design will be in accordance with the selection of specific equipment through the prepurchase process.
- Design of fuel cell system is not included except design of associated yard piping and space allocation.

- Tilt-up building design will be in accordance with the Parsons specifications. The tilt-up contractor will be responsible for all concrete work for the cogeneration building, including foundations and mechanical equipment housekeeping pads at grade and on the roof.
- Any permits required for the building or construction of the plant facilities will be obtained by the Agency or its construction contractor(s). We understand that such permits are not required.
- Cogeneration control system will require peer-to-peer interface with the Foxboro DCS in the control room in Administration Building B at RP-5.
- Cogeneration facility will consider Allen-Bradley PLCs (unless otherwise directed by the Agency during the predesign stage) to be consistent with the Allen-Bradley PLCs being installed throughout RP-5.
- The design of the cogeneration graphics will be consistent with the main control room graphics and with other IEUA projects. Parsons will coordinate with the IEUA SCADA group to ensure total uniformity in operator workstation graphics. Parsons is aware that IEUA has special requirements for the SCADA computer graphics.
- IC engines and ORC will be connected to synchronizing bus switchgear.
- Other than the tie-in to the existing 12-kV switchgear and upgrades of the electrical system between cogeneration building, electrical building and transformers, no modifications to the existing electrical systems will be made.
- The high-voltage switchyard will be within IEUA RP-5 property.
- Design of buried hot water piping from the engine room to the manure digester area is not included in Parsons' scope of work.

SUBTASK 4.1: PREPARE 30% PLANS AND SPECIFICATIONS

Parsons will prepare multiple discipline plans to the 30% completion level and submit them to the Agency with a detailed specification outline. The 30% submittal will include:

- Preliminary plans
- Outline specifications
- List of required permits
- Design calculations
- Update to the construction cost estimate

The Technical Review Committee will conduct a thorough quality check of the 30% design before it is submitted to the Agency.

SUBTASK 4.2: PREPARE 50% PLANS AND SPECIFICATION

After receipt of the Agency's written comments on the 30% design package, Parsons will prepare multiple discipline plans to the 50% completion level and submit them to the Agency, including a detailed specification outline with preliminary text. The 50% submittal will consist of:

- Site layouts and site grading plans
- Civil drawings and yard piping
- Process drawings (flow schematics and heat balance diagrams)
- Equipment layout

- Mechanical standard details
- Mechanical equipment layout
- Structural plans and details
- Electrical single line diagrams
- Electrical equipment layout
- Electrical conduit and wire schedule
- Process and instrumentation diagrams
- Description of process and control strategies
- Calculation package
- Technical specifications
- Environmental and permitting reports
- Updated estimate of construction costs
- Other project progress items

The Technical Review Committee will meet before the 50% submittal for a through quality check on the design. The Technical Review Committee comments will be incorporated before submitting the design to the Agency for review.

SUBTASK 4.3: CONDUCT CONSTRUCTABILITY AND INTERNAL VALUE ENGINEERING

Parsons will conduct an in-house comprehensive constructability and operability review at the 50% to 70% completion milestone. Our construction engineers and operations personnel will conduct the review to identify construction constraints or items that could be improved upon to make the facilities easier and less costly to construct and operate. Comments from the reviewers will be incorporated into the design as it moves toward completion.

Parsons will also conduct an internal value engineering (VE) to look for the cost saving options. This internal VE will be conducted by qualified senior staff as part of the QA/QC task.

SUBTASK 4.4: PREPARE 85% PLANS AND SPECIFICATIONS

Parsons will continue with the detailed design in all disciplines to subsequently produce an 85% level of completion. Detailed specifications will be essentially completed during this stage. The 85% submittal will consist of:

- Site layouts and site grading plans
- Civil drawings and yard piping
- Process drawings (flow diagrams and heat balance diagrams)
- Mechanical standard details
- Mechanical equipment plans and sections
- Mechanical piping plans and sections
- Piping support details
- Structural plans and details
- Electrical single line diagrams
- Electrical equipment layout
- Electrical conduit and wire schedule
- Process and instrumentation diagrams
- Description of process and control strategies
- Calculation package
- Technical specifications
- Environmental and permitting reports
- Other project progress items

The calculation package will include the electric power analysis consisting of a relay protection study, short circuit study, voltage drop study and harmonic analysis. These services are described in Task 4.7.

4.4.1 Conduct Detailed Quality Control Check

Parsons will conduct detailed discipline and interdiscipline checks of the drawings and specifications at 85% completion, which will include obtaining Agency comments and integrating them into the design.

SUBTASK 4.5: PREPARE FINAL (100%) PLANS AND SPECIFICATIONS

Parsons will finalize plans and specifications based on interdiscipline reviews, checks, and Agency comments. The team will also back-check to ensure that all "pick-ups" are included. The bid documents will include Agency's standard front-end documents, technical specifications, and drawings.

Parsons has estimated detailed design drawings, including general and standard details for up to 110 sheets for the basic design document as discussed under Task 4. Parsons understands that the actual sheet count may be different than the estimated count based on the scope of work outlined herein. Parsons will not request any fee adjustment if more than 110 sheets are produced for the design scoped herein. Conversely, the Agency will not make the fee adjustment if the number of sheets produced is less than 110.

SUBTASK 4.6: UPDATE CONSTRUCTION COST ESTIMATE AND SCHEDULE

At the completion of the 85% design, Parsons will prepare the construction cost estimate based on the quantity takeoff. This estimate will be finalized along with the development of final plans and specifications. It will be a "Class C" estimate according to the American Association of Cost Engineers guidelines. All costs will be in current dollars, referenced to the current Engineering News Record Construction Cost Index.

The project schedule will be updated at this point. Up-to-date information on major equipment delivery time and necessary sequencing will be used to refine the schedule.

Deliverables:

- Full-size (22" x 34") drawings: one set signed and stamped
- Reduced to half-size (11"x 17") drawings: one set
- Specifications: one set
- Final full-size drawings 22" x 34" Mylar (4-mil double matte) copies of the drawings: one set
- Electronic copies on CD ROM of specifications in MS Word 2000 and drawings in AutoCAD 2000 format: 2 copies
- Final calculations: 3 copies

SUBTASK 4.7 POWER SYSTEM STUDIES AND COORDINATION WITH SC EDISON

Parsons will conduct the power system studies and provide necessary coordination with SCE for the tie-in into the SCE grid system. The power system studies will include:

- Protection relay study
- Short circuit study

- Voltage drop study
- Harmonics analysis

Parsons will select relay types, manufacturers and will design a comprehensive protection system; select CT and PR ratios and connection configuration; design grounding generation and distribution system; select and size of the new portion of the electrical system up to and including the main switchgear; select circuit interrupting device ratings.

Deliverables:

➤ Three copies of the final engineering summary report and one electronic copy

TASK 5: PROVIDE SERVICES DURING BID AND AWARD PHASE

SUBTASK 5.1: ATTEND PREBID CONFERENCES

Parsons will attend prebid conference and job walkthrough to discuss the project with the bidders and identify critical aspects of the projects.

SUBTASK 5.2: PREPARE ADDENDA

Addenda will be issued to clarify any issues that arise during the prebid conferences or before bid openings.

Deliverables:

➤ Addenda
➤ Clarifications and responses to questions

TASK 6: PROVIDE SERVICES DURING CONSTRUCTION

SUBTASK 6.1: ATTEND PRECONSTRUCTION CONFERENCE

Parsons will participate in the preconstruction conference with selected contractors. Parsons will provide technical clarifications if needed during the preconstruction conferences.

SUBTASK 6.2: REVIEW SHOP DRAWINGS AND OTHER DOCUMENTS

Parsons will provide a list of shop drawing submittals. Parsons will review contractor submittals including shop drawings, manufacturers' documents, O&M manuals, warranty statements, and other pertinent documents for conformity with specifications, and will make corresponding recommendations to the Agency staff.

Parsons will:

➤ Receive and log shop drawings submittals.

- Maintain a computer-based shop drawing submittal-tracking system to ensure timely response and minimize potential delays.
- Review all shop drawings for completeness, transmit all submittals, and recommend a course of action to the Agency.
- Return shop drawings to the Agency upon completion of the review and maintain submittal record(s) for this activity.
- Maintain the shop drawing submittal file.

Parsons' fee estimate includes services relating to the reviews of initial submittals and second submittals. The cost of submittal reviews beyond the second submittal is not included in Parsons' fee. The levels of effort and fee estimate considered review up to 80 documents submitted by the contractors for both contracts, including shop drawings, and O&M manuals, and 40 second submittals (resubmittals) of shop drawings. The contractor will pay any reviews of third and following resubmittals.

Parsons' scope of services with respect to construction does not include or assume any responsibility for the methods, means, materials, inspection, or safety procedures employed by the Agency's construction contractors or their subcontractors.

SUBTASK 6.3: PROVIDE PLAN CLARIFICATIONS

Parsons will review and process RFIs forwarded by the Agency and return the responses within the contemplated budgeted timeframe. Considering limited budget for this subtask, the Agency will screen contractor's RFIs and forward to Parsons only those related to clarifications of and omissions from the contract documents that require design engineer's responses.

SUBTASK 6.4: PROVIDE CHANGE ORDER ASSISTANCE

Although the Agency will manage the change order process, it is anticipated that the Agency will request Parsons to assist with technical, cost, or schedule issues on any change orders. Parsons will apply its skills and experience in minimizing the change orders by advising the Agency throughout the construction period and by carefully crafting the responses to the contractor's inquiries, including RFIs and shop drawing reviews. Parsons will suggest field changes to minimize the change orders.

SUBTASK 6.5: ATTEND CONSTRUCTION MEETINGS AND PROVIDE SPECIALTY INSPECTIONS

Parsons will attend meetings with the contractor and its subcontractors. Necessary technical clarifications will be provided during meetings. Parsons included 2 visits by civil engineer, 4 visits by electrical engineer, 4 visits by instrumentation engineer, 3 visits by structural engineer and 12 visits by project engineer/mechanical engineer. Parsons anticipates an average of 4-hour duration of each visit.

The level of effort and fee estimate includes participation in the construction meetings for the entire duration of the 12-month construction phase.

SUBTASK 6.6: PROVIDE TECHNICAL ASSISTANCE FOR CLAIM AVOIDANCE

Parsons will apply its skills and experience to assist the Agency throughout the construction period to minimize claims by providing technical assistance, maintaining a positive working relationship, and assisting in identifying and resolving claims early and equitably. Parsons will evaluate all the claims submitted by the contractor from a technical point of view and submit its recommendations to the Agency for consideration.

Considering the undefined nature of this task, the level of effort and fee estimate considers 40 hours for this activity.

SUBTASK 6.7: PREPARE "AS BUILT" DRAWINGS

Parsons will revise original drawings to show changes as marked by the Contractors and provided to us by the Agency after the work is accepted as complete. The revised original drawings will be marked "Record" and will be delivered to Agency within 90 calendar days on Mylars and in AutoCAD format.

SUBTASK 6.8: PARTICIPATE TESTING AND STARTUP

Parsons will assist the Agency during the plant testing and startups by the contractors. Parsons will provide technical assistance and will witness the equipment testing at the RP-5 as needed. Considering the undefined nature of this task, the level of effort and fee estimate considers 96 hours for this activity.

SUBTASK 6.9: PREPARE PUNCH LIST AND ATTEND TWO WALKTHROUGHS

Parsons will prepare punch list during the initial walkthrough for a detailed checking during the follow-up walkthrough. Deficiencies noted during the first walkthrough will be documented. Parsons included participation in the second walkthrough to verify the contractor's implementation of the corrective actions.

SUBTASK 6.10: PREPARE OPERATION AND MAINTENANCE MANUALS

Parsons will receive from the contractor equipment operation and maintenance manuals, and warranties and guarantees for material and equipment installed on the project. The contactor submittals shall be verified against the requirements of the contract documents to ascertain contractor compliance. Tables shall be prepared showing the recommended maintenance schedule for structures and all equipment, as well as full descriptions of the proper overall systems operation and individual component operations as well as the maintenance of all systems and facilities. The material shall be compiled into a separate hardcopy manual(s) utilizing a format compatible with the Agency's standard O & M Manual system and suitable for library or field review. Consultant shall submit five (5) copies of said hardcopy manuals.

In addition, all O&M documents shall also be submitted in an electronic format (without hyperlinks). The format of O&M documents from the equipment manufacturers shall be the portable document format (.pdf) and shall meet the Agency's standards for clarity and file size, e.g. document must be fully readable yet not be exceedingly large. Where possible, these PDF documents shall be produced from the source file (such as from a Microsoft Word, Excel, or AutoCAD document) with a PDF document for each piece of required equipment. These files shall be organized and submitted to the Agency in a format that duplicates the organizational format of the hardcopy manual(s) with like types of equipment placed together on a CD for submittal according to Agency standards.

EXHIBIT B
CONSULTING SERVICES INVOICE

Consultant: Parsons Water and Infrastructure, Inc. Address: 100 West Walnut Street Pasadena, CA 91124	Pay Estimate No.:	Contract Date:	Invoice Date:
	Project No.: EN03029 Contract No.: CKB03076	IEUA Project Manager: Jamal Zu	This Period: From: To:
Project Name and Location: RP-5 Renewable Energy Energy Effici At RP-5	Account No.:		Consultant Reference No.:

ORIGINAL CONTRACT:

Task No.	Item Description	Original Contract Value	Total This Period From: 1/0/1900 To: 1/0/1900		Total to Date From: 1/0/1900 To: 1/0/1900		Progress to Date
		Amount ($)	% Complete	Amount ($)	% Complete	Amount ($)	% Complete
				$0.00		$0.00	0%
				$0.00		$0.00	0%
				$0.00		$0.00	0%
				$0.00		$0.00	0%
	Subtotal Original Contract:	$0.00		$0.00		$0.00	

CONTRACT AMENDMENTS:

Amend No.	Amendment Description	Amended Contract Value	Total This Period From: 1/0/1900 To: 1/0/1900		Total to Date From: 1/0/1900 To: 1/0/1900		Progress to Date
		Amount ($)	% Complete	Amount ($)	% Complete	Amount ($)	% Complete
				$0.00		$0.00	0%
				$0.00		$0.00	0%
				$0.00		$0.00	0%
				$0.00		$0.00	0%
				$0.00		$0.00	0%
	Subtotal Contract Amendments:	$0.00		$0.00		$0.00	
	Total Contract with Amendments:	$0.00		$0.00		$0.00	

PAYMENT SUMMARY FOR THIS PERIOD:

	Total This Period From: 1/0/1900 To: 1/0/1900
Amount Earned Original Contract	$0.00
Amount Earned Amendments	$0.00
Back Charges	$0.00
Amount Due This Period	**$0.00**

PRIOR PAYMENT SUMMARY:

	Total to Date From: 1/0/1900 To: 1/0/1900
Amount Earned Original Contract	$0.00
Amount Earned Amendments	$0.00
Back Charges	$0.00
Prior Payments	$0.00

TOTAL PAYMENT SUMMARY:

	Total Contract
Total Original Contract	$0.00
Total Contract Amendments	$0.00
Total Adjusted Contract	$0.00
Total Payments to Date	$0.00
Back Charges	$0.00
Balance of Contract	$0.00

CONTRACT SCHEDULE SUMMARY:

Contract Start Date:	1/0/1900
Contract Duration:	0
Contract Completion Date:	
Authorized Time Extension:	0
Revised Completion Date:	

PROJECT COMPLETION SUMMARY:

Contract Time Expired:	#DIV/0!
Contract Work Complete:	#DIV/0!

APPROVALS:

Consultant Approval:

Title:_____ Signature:_____ Date:_____

Inland Empire Utilities Agency Approvals:

Project Manager/Engineer:_____ Date: _____

Supervising Engineer:_____ Date: _____

Department Manager:_____ Date: _____

Executive Manager:_____ Date: _____

General Manager/CEO:_____ Date: _____

EXHIBIT C

TABLE K-1 (REVISED ON 10/24/03)
INLAND EMPIRE UTILITIES AGENCY RP-5 RENEWABLE ENERGY EFFICIENCY PROJECT
COST ESTIMATE FOR ENGINEERING SERVICES

TASK NUMBER	DESCRIPTION	HOURS (a)								COSTS ($)			
		A	B	C	D	E	F	G	TOTAL	LABOR	CADD	ODCs	TOTAL
	Average Billing Rates	160	136	110	95	90	75	60					
Task 1	PROJECT MANAGEMENT AND COMMUNICATION (Predesign & Design)												
1.1	Conduct Predesign Kick-off Meeting And Prepare Project Management Plan	24	36		24	0	0	8	92	$11,496	$0	$350	$11,846
1.2	Conduct Monthly Meetings and Prepare Project Progress Reports	80	124	76	96	16	16	48	456	$52,664	$480	$480	$53,624
1.3	Conduct Workshops on Key Issues	24	24	12	16	24	0	16	116	$13,064	$360	$600	$14,024
1.4	Conduct Presentations	24	24		24	0	16	16	104	$11,544	$240	$440	$12,224
1.5	Ensure Quality Control	48	144		96	0	0	32	320	$38,304	$0	$200	$38,504
	SUBTOTAL TASK 1	200	352	88	256	40	32	120	1,088	$127,072	$1,080	$2,070	$130,222
Task 2	PERFORM PRELIMINARY DESIGN FOR COGENERATION												
2.1	Evaluate Key Design Issues	64	240	72	64	16	16	32	504	$61,440	$480	$1,200	$63,120
2.2	Prepare Preliminary Design Report	66	150	132	128	88	136	80	780	$80,560	$3,360	$3,500	$87,420
2.3	Provide CEQA Assistance	2	60	0	0	0	0	4	66	$8,720	$0	$200	$8,920
2.4	Perform Permitting Assistance	12	64	0	54	0	0	12	142	$16,474	$0	$480	$16,954
	SUBTOTAL TASK 2	144	514	204	246	104	152	128	1,492	$167,194	$3,840	$5,380	$176,414
Task 3	PRESELECTION/PREPURCHASE OF MAJOR EQUIPMENT	64	124	168	120			80	556	$61,784	$0	$500	$62,284
	SUBTOTAL TASK 3	64	124	168	120			80	556	$61,784	$0	$500	$62,284
Task 4	PREPARE FINAL DESIGN AND BID DOCUMENT												
4.1	Prepare 30% Plans and Specifications	80	320	240	420	416	420	80	1,976	$196,360	$12,540	$1,500	$210,400
4.2	Prepare 50% Plans and Specifications	80	256	216	264	252	720	180	1,968	$183,936	$14,580	$2,500	$201,016
4.3	Internal Value and Conduct Constructability Review	24	84	0	24	0	0	8	140	$18,024	$0	$320	$18,344
4.4	Prepare 85% Plans and Specifications	80	144	180	216	320	432	200	1,572	$145,904	$11,280	$2,500	$159,684
4.5	Prepare Final (100%) Plans and Specifications	16	80	54	80	32	96	64	422	$40,900	$1,920	$1,500	$44,320
4.6	Update Construction Cost Estimate and Schedule	4	20	120		0	0	8	152	$17,040	$0	$1,000	$18,040
4.7	Relay Protection Study & Utility Interface/Coordination	16	176	160	0	0	0	24	376	$45,536	$0	$2,000	$47,536
	SUBTOTAL TASK 4	300	1080	970	1004	1020	1668	564	6,606	$647,700	$40,320	$11,320	$699,340
Task 5	BID PHASE SERVICES												
5.1	Attend Prebid Conferences	8	12		0	0	0	4	24	$3,152	$0	$160	$3,312
5.2	Prepare Addenda	8	32		16	0	0	8	64	$7,632	$0	$160	$7,792
	SUBTOTAL TASK 5	16	44		16	0	0	12	88	$10,784	$0	$320	$11,104

EXHIBIT C

INLAND EMPIRE UTILITIES AGENCY RP-5 RENEWABLE ENERGY EFFICIENCY PROJECT
COST ESTIMATE FOR ENGINEERING SERVICES

TASK NUMBER	DESCRIPTION	HOURS (a)								COSTS ($)			
		A	B	C	D	E	F	G	TOTAL	LABOR	CADD	ODCs	TOTAL
Task 6	PROVIDE SERVICES DURING CONSTRUCTION	8	12	0	4	0	0	4	28	$3,532	$0	$160	$3,692
6.1	Attend Preconstruction Conferences	24	210	188	40	24	0	52	538	$62,160	$0	$960	$63,120
6.2	Review Shop Drawings and Other Documents	40	120	96	24	0	52	28	360	$41,140	$780	$300	$42,220
6.3	Provide Plan Clarifications	8	80	40	40	0	0	8	176	$20,840	$0	$450	$21,290
6.4	Provide Change Order Assistance	36	72	32	32	0	0	24	196	$23,552	$0	$980	$24,532
6.5	Attend Construction Meetings and Provide Specialty Inspections	4	40	0	32	0	0	16	92	$10,080	$0	$300	$10,380
6.6	Provide Technical Assistance For Claim Avoidance	4	24	64	60	0	240	16	408	$35,604	$3,600	$500	$39,704
6.7	Prepare "As Built" Drawings	16	72	32	48	0	0	24	192	$21,872	$0	$320	$22,192
6.8	Participate Testing and Startup	4	32	0	16	0	0	8	60	$6,992	$0	$320	$7,312
6.9	Prepare Punch List and Attend Final Walk-through	24	120	96	64	24	40	80	448	$46,760	$704	$2,500	$49,964
6.10	Prepare Orientation and Maintenance Manuals	168	782	548	360	48	332	260	2,498	$272,532	$5,084	$6,790	$284,406
	SUBTOTAL TASK 6	892	2,896	1,978	2,002	1,212	2,184	1,164	12,328	$1,287,066	$50,324	$26,380	$1,363,770
	SUBTOTAL PROJECT (TASKS 1 THROUGH 6)												
	OPTIONAL TASKS												
2.3A	Perform Environmental Review *	14	120	0	160	0	0	76	370	$38,320	$0	$4,300	$42,620
2.4.A	Perform Permitting Services **	4	160	0	146	0	0	28	338	$37,950	$0	$9,770	$47,720
2.5	Prepare RMP and PSM Documentation	16	200	0	200	0	0	24	440	$50,200	$0	$2,500	$52,700
	TOTAL OPTIONAL TASKS	34	480	0	506	0	0	128	1,148	$126,470	$0	$16,570	$143,040
	TOTAL PROJECT (TASKS 1 THROUGH 6 AND OPTIONAL TASKS)												$1,506,810

* ADDITIONAL OVER AND ABOVE TASK 2.3

** ADDITIONAL OVER AND ABOVE TASK 2.4

(a) MANHOUR CATEGORIES

A = Project Manager
B = Project Engineer
C = senior Engineer
D = Staff Engineer
E = Senior Designer
F = Designer
G = Support Staff

December 17, 2003

RP-5 Renewable Energy Efficiency Project
Kickoff Meeting on Thursday December 11, 2003
Meeting Notes and Minutes

Meeting Date: Thursday December 11, 2003
Time: 1:00 PM – 5:00 PM
Consultant: Parsons Water and Infrastructure, Inc.
Prepared By: Jamal Zughbi

Attendees:

IEUA
Neil Clifton (Eng. Dept. Mgr.)
Jamal Zughbi (Project Mgr.)
Gary Bankston (PP&M Mgr.)
Jack Frazier (Op. Mgr)
Chris Berch (Chief Op)
Jeff Bowers (Chief Op)

Parsons
Surendra Thakral (Project Mgr.)
Voytek Muszynski (PE)
Tony Zavanelli (Mech)
Timothy Liu (Str)
Ruben Cossettini (I&C)

Part Time Attendees:
Pari Dezham (Env. Comp. Mgr)
Dave Wall (Construction Sup.)
Claudia Neighbors (Safety)
Craig Parker (Sup. Civil Eng.)

Note: At the end of each bullet (where applicable), the party responsible for the action item is shown in bold letters.

Minutes and Notes:

- Jamal Zughbi opened the kickoff meeting emphasizing the importance of this project and described it as a high profile, demonstration and innovative project that will be monitored and reviewed by the Department of Energy (DOE) and IEUA's executive management; therefore, top quality design and service are expected from Parsons.
- Jamal Zughbi also indicated that IEUA is currently working on a grant from the California Energy Commission (CEC). The CEC will also be reviewing the design submittals if the grant is awarded to IEUA.
- Jamal Zughbi stated that design submittals prepared by Parsons should meet the requirements of the DOE. Jamal is to forward a copy of the IEUA/DOE Agreement to Parsons. **(IEUA)**

- Surendra Thakral presented the Project Management Plan (PMP), which included miscellaneous project information, an organization chart, scope of work, a list of drawings, etc.
- Surendra explained the importance of the Decision Log on page 17 of the PMP where decisions associated with design criteria/equipment/changes would be logged for easy future reference and tracking.
- Monthly meetings shall discuss the decision log and cost summary.
- Jamal Zughbi requested Parsons to submit a revised schedule in lieu of the one included in the PMP in order to shown all tasks, start and finish dates of each task, and review periods for IEUA and DOE. **(Parsons)**
- Neil Clifton emphasized that if there is any change that may impact the design fee it should be approved by IEUA prior to starting the work modification; otherwise, Parsons will not be paid for that effort.
- Parsons shall modify the decision log to reflect impact on project schedule, design fee and overall project cost. **(Parsons)**
- Jamal shall send fuel cells information and DOE logo to Parsons. **(IEUA)**
- Safety: Parsons shall make sure that the project design considers all safety requirements such as warning signs, handrails, OSHA rules, ventilation, sound/noise protection, etc. Surendra indicated the project design will be reviewed by a safety specialist/ safety manager with Parsons.
- Gary Bankston indicated that ladders and cages should be provided where necessary for safety.
- Surendra indicated that safety requirements will be passed on to the contractor through project design.
- Neil Clifton indicated that IEUA will check if CEQA reports could be done by IEUA through the Planning Department and Tom Dotson & Associates. **(IEUA)**
- Jamal Zughbi to forward information on the UTC Power Organic Rankine Cycle (ORC) to Parsons. **(IEUA)**
- Neil Clifton advised that IEUA Board of Directors will not accept any projects or innovative equipment/system that exists only on paper nor will it accept prototype projects. He also said that IEUA is working on getting a grant from the California Energy Commission (CEC) for the RP-5 Renewable Energy Project.
- Neil Clifton said that IEUA is considering a near future project to add SCRs on the Desalter Plant engines to increase the power generation capacity by allowing the engines to run on either gas (natural or digester) without the annual operating hours limitation as currently stipulated by AQMD.
- Pari Dezham indicated that the current AQMD permit at the Desalter allows 60% natural gas and 40% digester gas mixing (by Btu ratio). Surendra Thakral will verify with AQMD if the same ratio can be applied at the RP-5 project. **(Parsons)**
- Surendra indicated that the purpose of the Technical Memorandum No. 1 (TM-1) during predesign is to investigate and evaluate the green fuel gas sources at RP-2 and RP-5 and how to use the gas efficiently at RP-2, RP-5 and the Desalter Plant.
- Jamal Zughbi emphasized that regardless of the fuel gas that will be used for new engines (natural or digester), the new engines shall be designed for digester gas, but provide the flexibility to also run engines on natural gas.

- Surendra Thakral indicated that predesign work will be done in two stages, evaluation of innovative technologies and engines configurations and then the detailed predesign (TM) work.
- Parsons shall evaluate the option of using chilled water storage versus ice storage for the thermal ice storage (TIS) system. Cost and performance analysis shall be implemented for both options. It was indicated in the meeting that space is not an issue when doing the evaluation. **(Parsons)**
- Neil Clifton and Gary Bankston indicated that the SCR issue at the Desalter plant could be addressed after completing TM-1 and new engines configuration is determined.
- Craig Parker indicated that IEUA does not currently have any power export agreement with SCE.
- Gas Cleaning Issue: Neil mentioned that there is a technology in Europe to treat and clean the manure gas, which is based on chemical reaction. No details were provided in the meeting. Parsons might want to investigate whether or not this technology could be implemented for this project.
- Surendra Thakral questioned if there is any siloxane in the digester gas and how is it treated. Gary Bankston indicated that there is siloxane in the digester gas at RP-1, and it is treated by increasing the compression and installing a series of large storage tanks to increase the retention time allowing the condensate and suspended siloxane particles to drain out of the gas stream.
- Gary Bankston indicated in response to a question from Surendra that engine spark plugs are replaced every 1,000 hours of operation. Parsons will include the 1,000-hr requirement for spark plugs in the engine specifications.
- Engine RPM: IEUA indicated that engines with rotational speed higher than the specified 900 rpm (in the RFP) such as Jenbacher (1,500 rpm) may be considered if a technical and commercial evaluation and justifications could prove that it is economical to do so. Evaluation and analysis should include life cycle analysis, power generation cost per kW, reliability, 20-year engine life, salvage value after 20 years; and at least a 10 year maintenance guarantee shall be obtained from the manufacturer.
- Interconnection Agreement with Edison: Neil Clifton strongly emphasized the importance and sensitivity of this issue which is a big concern for IEUA in light of the tremendous problems that IEUA has experienced in the past. IEUA needs to know who will be doing what in addition to continuous and effective coordination between IEUA, Parsons and Edison, and what steps are to be taken in order to avoid past problems.
- Surendra Thakral indicated that the electrical coordination study was added to the scope of the project to avoid such coordination problems with Edison and to comply with their requirements.
- Neil Clifton indicated that all discussions and decisions related to the interconnection and coordination with Edison need to be logged in the decision log and may also be recorded.
- Surendra Thakral indicated that he will bring Neil Nichols w/KSG, coordination study consultant hired by Parsons, to the next meeting between IEUA and Parsons. Surendra indicated that Neil Nichols has the experience to handle

coordination with Edison and he is familiar with Edison's requirements. **(Parsons)**

- It was also decided that Craig Parker will attend this meeting, and Jamal to invite the appropriate Edison people (technical and contract) to the meeting and coordinate with Surendra to bring Neil Nichols to same meeting as well. **(Parsons and IEUA)**
- Surendra indicated that Parsons will not ask for more money to obtain and identify the requirements of SCE.
- Craig Parker indicated that Rule 21 is the main reference that SCE is using for interconnection agreements. Craig also indicated that SCE wants to see the design submittals and drawings related to interconnection and interface with the grid.
- Craig Parker stated that early discussions with SCE to explain the project, discuss Rule 21, and get them involved at an early stage is highly recommended in order to avoid any future problems and delays.
- Cogeneration Building: Surendra indicated that reportedly tilt-up buildings smaller than 10,000 ft^2 are not economical. Jamal indicated that the cogeneration building may be closer to 10,000 ft^2 especially with the additional space for the future fuel cell and gas treatment system if located inside the building.
- Surendra advised that masonry and brick building might be a better choice for the cogeneration building.
- Dave Wall indicated that the tilt-up buildings with 30 feet height are not easy to build and require additional work and base to do that.
- Surendra advised that tilt-up building base and engines foundations, engines, columns for the overhead crane can all be installed prior to installing the building walls around the engines.
- Block or brick buildings shall be part of the general contractor scope and no pre-selection is required by Parsons. Neil indicated that this reduced task for Parsons results in some savings which could be adjusted or worked out later if additional scope is implemented to this project.
- The three building options available are: tilt-up, split face and block with stucco on the outside. Selected building exterior to match and/or blend with the existing headquarters building color and surrounding environment.
- Surendra Thakral advised that Parsons will start working on the ORC, TIS and fuel source investigations (TM-1) right away.
- TM-1 will determine the desired engine size and configuration for this project.
- Neil Clifton recommended that Parsons looks at the RP-2 and RP-5 digesters loading (existing and future) to help determine the engine size and configuration which should be inline with the future loading and gas production. Neil also mentioned the bypass project from RP-1 to RP-5, which is part of the odor control project at RP-1. Also food waste will be added at RP-2 and RP-5 to enhance the digester gas production.
- Neil Clifton stated that another potential project is to run a 12 kV line from RP-5 to RP-2 to enable running the new RP-5 engines at full load; however, IEUA will evaluate the feasibility of this project in more details later on.
- Next meeting is to be decided after coordinating with SCE and Neil Nichols so that both parties are available for that meeting. **(IEUA and Parsons)**

- After January 20, 2004, the Agency will notify Parsons if two additional digesters are being constructed at RP-5. **(IEUA)**